

# BOMBAY PRESIDENCY. INDIAN IRRIGATION COMMISSION. MINUTES OF EVIDENCE.

## THE IRRIGATION COMMISSION OF 1901-02.

#### BOMBAY PRESIDENCY.

Col. SIR COLIN SCOTT-MONCRIEFF, K.C.M.G., C.S.I. (President.)

Mr. T. HIGHAM, C.I.E.

Hon'ble Mr. DENZIL C. J. IBBETSON, C.S.I., I.C.S. Hon'ble Mr. P. RAJARATNA MUDALIYAR, C.I.E., Hon'ble Mr. J. W. Muir Mackenzie I.C.S. (Temporary Member for Bombay.)

MB. W. B. GORDON, (Secretary.)

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## BOMBAY PRESIDENCY.

## FIFTH DAY.

Sukkur, 5th November 1901.

Replies to written enquiries, laid before the Commission by Mr. E. F. Dawson, Superintending Engineer.

Question No. 1. Area irrigated during the last 10 years in Sind, including both Divisions.

Caraly and Ban	dr.						Acr	Val Iri	IGATI	O <sub>2</sub>					<del></del>	
	[	1690-9	1. 183	1-03.	1822 8	3. 1603	18:	1-03.	02-298	1200.	07.   100	7-99.			Avera	go, Aren
MAIOR WORES		Acres.	Acr	64	Acres	1	res Ac			-	100		808-90.	1600 00		commanded
Descrit Canal Unitar Wate I - can Canal I - can Canal Eastern Sara Estic	em.	121,0 2),0 111 (1 224,0	3)   10 23   174	130 233 719	03,15 21,27 102,62 13,11	4 89	559 103 671 57 3-3 211	131 I 110, 110,	cres. 03 332 62 (0) 53,311 93,141	1 85 6	78 19 01 77 31 23	0 234 10 9 060 5 1,032 23	2,804 1,72)	Aeres, 123,588 76,041 230,823	Acres 103,6 72,8 238,1	39 412.94 214.03
	L	617,93	450,	093	354,30	529,	158 677.	033 63	1,726	(3),01	_			335,400	213,5	(2) 1,133,17
Mixon Wongs.			-	- -		<u> </u>	-	-			783	,622 C6	,051	20,863	610,4;	2,403,00
Werks for which Co tal and liev nec - vounts are lept,	Ić.						İ								** ****	
Sultur Canal Gher Cond Michal Wah Michal Wah Albhar Kachri Great Marsh Sartraz Telcir Canal		67,193 213,114 13,213 8,331 40 421 27,614 332 765	270,3 17,3 10,5 51,11 27,12 221,01	3 20 12 1 12 1 13 2 3 33	19,789 13,659 1,231 0,972 9,783 9,770 1,074	07 80 279,00 19,70 12,22 01,30 51,30 331,23	201 14 4 1 1 1 3 3 61 5	77 14 27 1 14 15 16 61 27 32	3.25 7.25 .073 .035 .030	85,023 233 373 12 327 11,394 66,110 32,220 305,200	251, 13, 12,	765 10- 207 12 213 11 03 03 63 51	761 21 761 1 011 6 935 5	72,209 [0,921 [2,709 [0,110 [0,020 7,947 [1,553	86,309 231,231 15,053 11,103 00,651 30,772	(a) 78,000 (a) 78,000 (a) 86,300
TT*	<u> </u>	73,853	750,07	7:7	1001	£37,47(	612,71	073,	312	F05,703	817,1				340,787	(a) 202,000 (a) 1,277,000
Wirks for which call Revenue Accounts ar kept.	7			1	- 1			-	- -		<u> </u>	-		1,317	762,109	2,710,192
Canals in Shikarpin Dietrict Western Nara Dietrict Other canals in Western Sava Dietrict Canals and bands in Karachi (anals District Canals and Sands District Canals and Sands District Canals and Sands District Canals in N. H.	1 2	33,299 97,328 93,270	145,500 217,938 E6,730 185,E60	237,	740 740	15 1,635 210,0 9 69,932	73,9%	170,6 43,6	11 .	*2 178 25,0;3 *2,13;	270,55 253,54 63,17	2 202.6	215	.771 591 029	176,057 210,710 .59,945	410,870 433,279 172,541
Other canals in C ar	17	1,176	£03,15G	321.0	_	333,330	213,524			1,519	211,076	0,0	0 210,	323	2)6,928	£63,145
District	)				1	,550,550	321,603	310,70	¥7   32	1,022	159,153	1	1	```i(	319,265	)
Lana's Destroit	:0	.314	\$0,637	19,1	20	17,860	19,754	19,03	2	2.431 ·	25,076			۱۳ ا		). (a) 2,270,431
Ĺ	503	,077	935,766	1,054,5	29 99	77,263	,139,571	£02,51		9,519	····	:3,51	28,0	51	21,213	(a) £0,000
DESCRIPTION VORTE.					- -						1,100,155	051,040	977.8	20   1,0	002,163	3,037,633
unia in right Bank Division	4,1	:59	3,717	3,00		13,012	47,371	29,10	41	1,707	45,694	17,335				
and Teres, Sind ,	2,103,4	73 2,10	හ. <b>යා</b> /	3°0,0;	2,50	6,277 2, la th- I	535,77*	000	2,497			7,450,052	18,5	<u> </u>	25,729	. 67,691

Left Bank Disting.—Note I —There is no cultivation in the I D. B. Derision on works for which reliker Capital are Revenue amounts are kept.

Note 8.—Culturable area and area irrigable by complete system, and all present, are given at page 1 to of the Revenue

(a) Irrigal L. area per year is calculated at one-third.

(b) Pres not include the Jameso area.

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Question No. 2. Area cultivated in Sind for the last 10 years, showing Proportion of Flow to Lift Irrigation.

Questions Nos. 3 and 4. Statement showing irrigated Area, consolidated Assessment thereon, and Remissions in Sind for 20 years, commencing with 1880-81, as compared with variations in Bukkar Gauge.

1				PERCENTAGE OF			variations in Bukkar Gauge.						
Year.	ARE	A CULTIVA	TED,	LIFT AND FLOW.					Confoli-		BUKKAR GAVOT.		
	Lift.	Flow.	Total.	Lift.	Flow.	Total.	Year.	Arca irrigated.	dated	Remis- gions.	Over		Over
	Acros.	Acres.	Acres.	Acres	Acres	Aeres.					10'	12	13'
1890-91	610,8%	1,341,250	1 955,149	31	60	100		Acres.	Rs.	Ra.			'
1891-92 .	625,111	1,402,645	2,193,803	32	63	100	1680-81 1481-82 *. 1882-83	1,492,669 1,601,956 1,673,203	82,78,173 88,01,294 38,53,315	61,757 31,852 2,11,706	85 98 108	76 99	46 41 79
1892-93	715,540	1,716,514	2,462,051	30	70	100	1850-81	1,519,831	36.99,141	93,379	91	153	31
1893-91	SJ7,41S	1,019,280	2,754,725	29	71	100	1881-85 1885-86 1886-87	1,783,173 1,789,919 1,811,650	41,88,316 40,75,152 42,57,018	1,12,018 1,56,416 1,36,419	110 99 96	79 72 79	53 53 51
1894-95	693,518	2,190,161	2,563,071	24	76	100	1587-58	1,871,114	43,07,913	61,937	73	57	45
1895-96	666,736	1,551,598	2,215,581	29	70	100	1839-50 1839-00 1870-01	2,115,635 2,319,819 2,213,473	49,36,703 44,77 205 52,31,860	63,015 2,22,002 67,815	91 88	58 81 63	30 76 37 30
1896-97	701,423	1,916,232	2,650,755	227	73	100	1801-02 .	2.165,631	52,61,210	1,53,000	83	41	30
1897-98 .	681,202	2,859,865	3,011,067	52	79	100	1892 93 . 1893-94 . 1891-95 .	2,329,015 2,354,277 2,635,725	18,33,753 55,45 318 61,88 925	2,71,130 1,51,997 3,51,666	59 86 97	57 20	58 41 80
1893 99 .	677,211	2,660,628	2,677,312	25	75	100	1505-05	2,006,777	39 62 310	2,79 (93	£5	41	25
1899 1900	713.707	2,057,195	2,771,502	26	71	110	1566 97 1897-93 1595 99	2,407,356 2,406,053 2,456,052	60,08,500 69,27,051 61,55,221	1,43,014 2,43,063 2,05,655	52 02 26	65 66 42	49 57 5
Nete.—The	abore area	v= include G	iovernment	, Jagis	and D	ubari.	1893-1990	2,545,500	61,10,030	5,59,316	73	30	8

Question No. 5. Areas that might be brought under irrigation by proposed extensions of existing Canals or by the construction of new enes in the Province of Sind.

•	Canals.	Culturable Area commanded.	Area com- manded by sanctioned Projects.	Area com- manded by proposed Extensions	Total
	RIGHT BANK DIVISION.				•
Begari Canals District .	Unhar Wah	442,215 214,056 680,521 81,387	•••	 71,159	412,245 211,656 751,683 34,387
		1,371,209		71,159	1,412,363
Shikarpur Canals District	Canals in Robri Sind Canal Rajib Canal Chiti Canal Garang Canal Kasimpur Bund Snkkur-Begari Bund	195,770 169,114 12,600 15,000 9,000 800 46,400 445,631	(a) 120,t91	1,200	817,564 169,111 12,600 15,000 9,000 800 46,400
Ghar Canals District .	Sukkur Canal	192,207 457,565 7,613 657,416	***	90,000 275,000  365,000	252,207 732,566 7,643 1,022,416
Western Nara District .	Canals in Western Nava Dis- trict.	637,469		91,893	729,862
Karaohi Canals District.	Canals in Karachi District .  Total Right Bank Division	563,145 8,677,923	120,591	85,000 561,252	598,145 4,962,763

# 5. Areas that might be brought under irrigation by proposed extensions, etc .- concld.

Canals.	Culturable Area commanded.	Area com- manded by sunctioned Projects.	Area com manded by proposed Extensions	Total.
LEFT BANK DIVISION.			<u> </u>	-
Northern Hyderabad Canals District    Michael Other Canals Dad   Nasrat   Nanlakhi	75,000 1,424,663  56,300 277,010 202,010 851,763  1,577,000 99,600	351,170 372,213 189,350	61.870 45.821 30,000	78 0A 1,421,665 884 17; 272,243 189,350 277,900 202,000 61,270 45,821 30,000 1,577,000 20,600 101,619
ammo Canal Dictrict . Allthrac Dim Wah Heran Khipra Thar Hera Hara Wah	275,500 599,800 52,000 9,000 45 000 141,800	*** *** ***	303 010 010 011 011	6,070 275,500 599 800 52,000 9,000 45,000
TOTAL LEFT BANK DIVISION	770,000	50,237	***	141,800 50,237 770,000
Grand Total	6,472,401	997,658	111,101	7,614,250
Total Total	10,150,324	1,118,252	708,413	1,977,019

Question No. G. Relation of the total irrigated Area to total cultivable Area in the Province of Sind.

Districts.	Total irrigated Area.	Total cultivable Arca.	Percent-
Indus Right Bank Decession.	Acres.	Acres.	Aeres.
Becari Canals District Shikarpur Canals Dis- trict Ghar Canals District Western Nara District Karachi Canals District	365,905 192,652 322,649 281,454 205,988	6,555,276	
TOTAL .	1,372,717	6,555,276	21
Indus Left Pank Divi- rion. Instorn Nara District Northern Hyderabad Canals District Central Hyderabad Can is District Fulcil Canals Dis- trict.	245,514 433,996 065,050	5,670,600	
TOTAL .	1,047,620	5,679.620	18:45
TOTAL, SIND	2,410,337*	12,231,966†	19:78

\*Average of last ten years.

Acros.

†Klelat
Lippor Sind Frontier
Shikarpur Collectorate
Kazachi Collectorate
Thar and Parker
Lyderabad
Total Sind

Acros.

318,850
1,214,356
3,820,660
4,820,660
4,231,214
6,555,276
5,670,699
12,231,936

Question No. 8. Canals which are ordinarily able to obtain a perennial or cold weather supply are the following:

Eastern Nara (2) Jamrao Canal, including Dim.
system, omitting (3) Mithrao.
(4) Thar.
(5) Eastern Nara.
(6) Heran Wah.
(7) Sukkur Canal.

Question No. 9. Extent to which the supplies to the canals have been affected, if at all, by the withdrawals for new canals in the Punjab.

ME. H. G. PALLISER, UNIEF ENGINEER, INDUS RIGHT BANK DIVISION.

I cannot find any ovidence of the canals in this Division having been prejudicially affected by withdrawals for the having been prejudicially affected by withdrawals for the hanjab. The question would, of course, only arise with respect to the rabl or cold weather discharges, which unfortunately have not been gauged in Sind, except for the last two years by the Indus River District, so that no definite information is forthcoming by which the cold weather supplies of the river can be compared before and after the opening of the new Punjab Canals and one or two I believe, in Bahawalpur.

2. I am inclined to doubt whether our rabi supply to the Sukkur Canal has been practically affected up to date by Punjab withdrawals, but it is of course obvious that there must be a limit, and that any further extensive draw-off above Sind might materially diminish our cold weather supply and diminish our revenue.

MR. E. F. DAWSON, SUPERINTENDING ENGINEER, INDUS LEFT BANK DIVISION.

So far us can at present be ascertained, the canals in the Indus Left Bank Division have in no way been affected by the withdrawals for new canals in the Punjub.

Extract from letter No. 01394 I., dated 11th October 1901, from the Secretary to Government, Punjab, to the Commissioner in Sind.

Canals in the Punjab on the Indus and its branches, which have been constructed and opened in the last 20 years with the full supply of such :-

Name of Rivor.	Nature of Canal.	Name of Canul.	Full Sapply.	Date of Open-
		,	Cuscos	
Sntlej	Perennial .	Sirbind . Canal.	8,000	24th November 1893.
***	Inundation .	Lower Fohag and Para.	1,450	Kharif 1895.
Chenab	Poronnial .	Chenab Canal.	10,730	March 1892.
JŁolum	Perontial •	Jholum Canal.	3,800	To be opened on Soth Octo- ber 1901.
•••	Innudation	New Sahi- wal Canal.	1,100	Enlarged in 1889.
Ravi	Innnôntlon. but provided with a weir on the flavi.	Sidhnai.	2,285	27tlı May 1686.
Beas	***	Nil.		
enbal	994	Nil.		
Swat	Perennial .	Swnt River.	775	12th February 1885.

Question No. 10. Necessity for (11) benefits to be derived from, and (12) practicability of constructing a weir at Bukkur near Sukkur.

Me. H. G. Pallises, Chier Enginees.

The reply to enquiry No. 10. whether the necessity for n weir nt Bukkur, as proposed by Sir Evnn Jnmes, has been felt, is in the negative.

And to No. 11, the Sukkur Cuml and possibly the Sind and Ghar Canals would be benefited by the construction of such a weir.

Question No. 13. Do the results so far attained on the Jamrao Canal indicate that it will be as successful, and that it will irrigate as large an area as anticipated in the revised estimate?

#### Mr. E. F. Dawson, Superintending Engineer.

The results so far attained on the Jamrao Canal indicate that it will be as successful and that it will irrigato as large an area as anticipated in the revised estimate, viz., 258,000 acros a year. Though in the Southern District, Jamrao Canal, all the water-courses have not been completed, and nearly half the area of the land under command in that portion still remains to be given out for onlivation, with the canal running only two-thirds full, the revenue during 1900-01, the first full year of the working of the canal, exceeds that of the estimate (Rs. 3,95,546) for the seventh year of its working by nearly Rs. 20,000, while the area (176,137 acros). vide Statement G, differs very little from that estimated (178,750 acros) for the seventh year, and in a few years more will even exceed the estimate to probably a great extent.

Question No. 14. Statement showing Lands irrigated in 1900-01 from private Canals which are not un ter the control of the Public Works Department.

	Goerramont Lands.			Inar	n Land	is.	Grand Total.		
District.	Kbarlf.	Rabl.	Total	Kharif.	Rabl.	Total.	Kharif.	Rabi.	Total,
Karachl . Hyderabad Shikarpur.	2,031	1,952	21,458 7,786	900	127	1,027	6,731		8,813
_	30,923	11,306 21,638	61,559	_		0,179 10,475	_	_	

Question No. 15. Generally, what scope is there for extensions of irrigation in Sind, including Khelat or other foreign territory, and in what order should they be considered?

Mr. E. F. Dawson, Saperintending Engineer, Indus Left Bank Division.

There is no further scope of financially successful cultivation in the Northern and Control Hydernbad Canals Districts, but in the Fuleli and Eastern Nara Districts there are, however, large tracts of uncultivated waste which might be brought under irrigation, but nothing definite can be said till the contour survey of the Fulcli District, which has now been commenced, is completed, and the Eastern Nara District is thoroughly surveyed. The extention of irrigation, however, dopends on outside colonists, as the area at present outlivated in this Rivision is more than sufficient for the labour available from the present population.

No. I.—Preliminary Note on the Proposed Burker Weir by Mr. E. F. Dawson,

With reference to the questions asked about a Bukkur weir, I am still not in a pesition to say whether it is practicable or nut. Enquiries are, however, proceeding, and I hope to know more about the site before the Commission reach Sukkur next mouth.

In the meautime, caquiries should proceed regarding possible increase in revenue, if the weir is practicable and is ever built. Very approximate figures will suffice in order to enable us and the Irrigation Commission to decide whether the scheme is worth proper investigation. That is all that is proposed now. I am not proposing a weir yet. This is merely our preliminary enquiry to get some idea of the revenue reasonably to be expected and the return it would yield on the probable costs.

For the present thou, let us assume the wier is practicable, that there will be no practicable engineering difficulties which cannot be overcome. I will, in the course of the next week or so, have completed an estimate of approximate figures of cost.

Meantime, to form any opinion of the roturn the project should give, it would help if the revenue were considered. Massa. Rien and Tupper should be able to assist. The Commissioner's knowledge of the country is, I nuderstand, also considerable.

The work under consideration is a low weir of solid mascury on which to construct falling gates. With gates up we would have the water in the river at Sukkur nlwnys standing at or nbove 125 ft. on the Bukkur gauge. In the flood season, the gates—a part of them—would be dropped, and we would always maintain the river at the present average height of Bukkur or above it—something over 13 ft. on Bukkur,—and maximum floods might rise to 21 or even 22 ft. Bukkur as compared with the present maximum of 18 ft. Of course bands, etc., will be raised to stand this increased flood height. The danger this might expose us to will be considered hereafter, but please neglect it for the present. We are assuming the scheme as practicable just now.

Here, then, are the conditions for the purpose of revenue estimate.

A 12-ft. weir at Bukkur will bare effect as follows on the Sind Wah:-

When now, on about 10th Moy, we get a foot of water on the sill of the equal, the weir will raise the level to 1.66. (Trivial.)

On 1st June, in average years, we have 3:50 ft. on the Sind Wah gange. With the welr, it will be increased to 4:90—say, 5-ft. (Important increase.)

On 28th June, we have now 6-ft. With weie, this will be increased to 8-ft. (Important increase.)

The weir will render up practically independent of changes in the mouth of the Sind Wah. It will not, hawever, increase the oupply in July and August: the present supply would be maintoined then. Little more out be said than this.

The early supply would be assured, and supply in July and August remain practically unaltered.

The weir will convert the Sukkur Canol, into n perenuiol cinal, and have an excellent supply throughout tho whole year.

A new head from above the weir to the Ghar will enneert the Ghar into a percunic causl. It might take a line somewhat as shown an the ucc impanying tracing, and would not only give water to a large tracet which has suffered of late years, but would render the Ghar practically independent of changes in the river at the month of the Ghar, and should suffice for an area much in excess of any area over yet cultivated.

No. II.-Note by Mr. Dawson on the Proposed Weie at Burkur.

Three questions, Nos 10, 11, and 12, have been asked concerning a weit at Bukkur. I take No. 11 first.

11.—" What canals would be benefited by the construction of such a Weir, and to what extent?"

The Ghar, Sukkur, and Sind Canals on the right bank and the whole Jamran and Eastern Nara systems an the left bank would be benefited. With a weir at Sakkur, it will prolably also be advisable to re-eansider a project for a better supply to the Khuirpur State and the Hyderabad District, Air. Joynes's Hyderabad Canals praject having been condemned partly becouse the water was carried for a great distance at a considerable dapth below the surface of the ground.

- of the ground.

  2. With a weir at Sukkur, the Ghar and Sukkur Canals (with a new feeder to the former from abore the weir) would be acconverted into percunial canals, and be rendered capable of annually irrigating a camblaced area of kharif and rabi at least equal to, if not causiderably greater than, the sum of the greatest kharif and rabi areas ever yot irrigated. The Sind Wals, being nearly 30 miles up river, would be only slightly improved, but there is no doubt that it would be improved to the extent of having a better early supply and also a somewhat better late supply than at present.

  2. The present supply to the leaves and Parkers.
- at present.

  3. The present supply to the Jamran and Eastern Name systems is taken off from the river above Bukkur through the Nara Sapply Chounel and is ample for requirements, except, perhaps, in a low river. It was despened in 1892 and is supposed to be sufficient, but frame the fact that hariferops on the Jamran are now being irrigated by rotation in this the scenad year of cultivation under the Jamran, it may not unreasonably be concluded that a limit to extensions an tha Journa and Eastern Nara systems will-seen the received. The Jamran is, however, already irrigating nearly the full duty of the water it can carry, so that there is no fear that the present supply channel is not capable af fulfilling its intentions; but if fineds can be cut off from the Eastern Nara Valley, there is room for considerable extension of cultivation there, and, were a weir constructed at Sukkur, the whole off this area and that under the Jamrao would be rendered independent of finetuations in the helight of the river supply.
- 4. The increase in revenue these improvements will yield is a question far eareful enquiry. It may possibly be raughly estimated by the Revenue afficials without much difficulty for the right bank of the river, and the Commissioner in Sind will, perhaps, be able to answer the question before the Irrigation Cammission vielt Sukkur, but it may softly be said that it will amount to lokhs of rupe's on the Sind, Sukkur and Ghar Canals alone; and, even neglecting the left bank improvements altogether, it

appears at first sight, at any rate, that a project for the weir Is worth investigating further.

5. I take question 10 next.

#### 10.-" Has the necessity for a Weir at Bukkur as 1 toposed by Sir Eran James been felt?"

The Ghar and Sokkur Canals, two of our most important revenue-yielders in Sind, have for years shown great fluctuations in irriguted areas consequent on variation of heights of water in the river at different seasons of the year, and tho Ghar has affered also particularly of late years from changes in the dhand supply where it takes off from the river. Indeed, camplaints have been so loud and real, especially as regards the higher areas user the month of the canal, that the Irrigation Department contemplate undertaking a survey with the object of completely remodelling the canal. Though, however, large additional areas may be brancht under cultivation by a re-modelled canal, it is rather improbable that the higher lands near the month of the Ghar will receive hensift from such a scheme so long as a month is taken direct from the fiver any where below Sukkur. Even a manth from above Suklur would not appreciably unprove the present canditions, as the antural levels do not permit of it, unless a weir be constructed to raise the supply level at the lind, and the only way in which the higher lands of the Ghar can be made independent of the changes at the month and af annifavourable falls in heights of the river is by the construction of such a weir.

6. In sa for, then, as improvement in the sapply has

G. In sa for, then, as improrement in the supply has been known to be desirable on bath the Sukkur and that Canals, the necessity for a well at Bukkur seems to have been recognised for years. Indeed, so long ago as 1835, Licutenant Fife, I...K., proposed taking off a now head from shore Sukkur for the Ghar Canal, but it would appear that the aver-worked Engineers in Sind have never had time to spare for the inrestigation of a praject for a weir, and the site has, I believe, generally heen supposed to be extremely unsuitable and difficult, if not impossible, for that abject. I have more than ance been informed that there was a hole in the river hed of the Rohri garge which has never been bettomed by soundings. This brings me to question No. 13

## 7. 12.-" Have any investigations been made to show the practicability of such a Weir ?"

- 8. Last season, Mr. Corbett, Excoutive Engineer, Indus River Distilet, and I sounded the Rohri side channel from a launch, and seemed to find bottom all the way through it, the deepest sounding recorded being 68 feet, and a few soundings taken across the channel abuve the garge apparently gave rock bottom at deepths in most places than 30 feet and in mony places and; a few fact below law-water level Further investigation could not be made before the inendation season, and it was postpened until this cold weather. I have now had a hurried creas section taken as aligned by the section taken as line between the heads of the Sukkur Caral and Nara Supply Channel and attach horewith plan and rection, shret Na. 1, showing results. There has been no time far rehable begings to be made, and the bottom rock has been found merely by sounding and by prabing with an iron shed homboo and with a long iran bar under difficult caaditions, with the river 6 feet on the ange, so the depths shown may be some what insecurate; but those seems no doubt that rock can be found an this line at approximate doths given an the cross section, which are coundinge below a stage of 6 feet on the Bakkur garge. There is uncertainty abnot parts of the seetian shown datted.
- P. Much more favourable conditions may exist—the deep hole shown on the section may die out a few handred for up-streim; but without a complete survey of the led at the river for some hundreds at feet up and down stream, there can be no certainty of this, and I therefore propose at this stage of the enquiry to assume that the section is as plotted.
- as plotted.

  10 Starting from the Sukkur side, we find rock at depths of from 1 to 8½ feet below the zero of the Bukkur gange for a distouce of 2,400 feet; from 8½ feet at 2,400, it drops to about 36 feet at chainage 2,600; and from 3,100 it sizes to 9 feet at 3,300; and onwards it gradeally rises until the Bukkur zero is met at chainage 4,600. With the exception of the deep partion between 2,100 and 3,300, there would be no serious difficulty in putting in the foundations for a well, although parts at it might here to be done under compressed all in suitable causeous. But

whether the 900 feet length in deeper water could also be satisfactorily dealt with is a question for more serious cousi-deration.

- 11. Before discussing this point, however, I propose to briefly review the whole project. There are difficulties attending it which are inter-dependent with the weir design.
- 12. For the present, let us assume that foundatious can be hid on this site and that we can construct on them a solid weir up to 3 feet on the Bukkur gaugs. Above this, we will provide a weir or dam fitted with suitable openings (regulated by gates) for the passoge of floods.
- 13. The calculations to find the effect of the weir on low and high river water levels involve fixing data-regarding height at which cortain discharges occur, their sectionial areas, velocities, etc., all of which are given in the attached "Colculations." All of the important data have been obtained from results of discharges measured in the last two years and from gauge heights of which we have a record for over 40 years to refer to. The lowest discharge for calculation purposes has been taken at \$0,000 ouble feet per second and the highest at \$00,000 cubic feet per second and the highest at \$00,000 cubic feet per second. The latter is supposed to occur without a weir at 18 feet on the Bukkur gauge, a height which has never been realised; and although the discharge at such a height might quite possibly exceed even \$00,00), it will not seriously affect the design, the height at which the moximum fleed is fixed being the important feature for that purpose.
- 14. The calculations show, with weir solid to height of 3 feet on the Bukkur gauge and with movemble gates of 9 feet height above this for width of 4,100 feet, that the following will be attained:—
  - Immediately above the weir the low-water level will
    be permanently raised to 12.5 foot on the
    Bukkur genge. It will gradually rise as the
    discharge increases on the river, and can be
    maintained by regulation of the gates at a
    height of 18 feet on Bakkur at all times when
    the river's discharge exceeds 200,000 cubic
    feet per second. (In practice, it would not probably be accessary to maintain this height:
    the gotes will be lowered to unintoin the water
    lovel only at height required by canal head
    works). The maximum flood discharge with
    gates open would pass over or through the weir
    at a height up-stream of the weir of 20.25 feet
    and down-stream at a height of 18 feet on the
    Bukkur gauge, ie, the construction of the weir
    will cause a rise in the maximum flood level at
    the weir site of 2.25 feet. (Of course, if gates
    can be provided at a lower level than referred
    to, this flood level will be lowered. However,
    the ostimates for protective embankments, etc.,
    are at present fromed, to be on the safe side,
    on this assumption.) At the Sind Canal,
    which is about 30 miles up-streom in low river
    and 25 or under in high water, the effect of
    the weir will be as follows:—
    - Where now we get one foot above sill on 10th May, we would have, with gates closed on the Bukknr weir, 1.65 on the Sind Canal.

      On 1st June, with an average river, we now have 3.5 on the Sind Canal and with the weir we would have 4.90.
    - On 29th June, we have 6 fect on the Sind Canal, and with the weir we would get 8 feet. Therenfter, gotes would probably be opened, and lovels in July and Angust would be much the same, but slightly bigher than nt present. The weir would have practically no effect on the Bagari or any canal north of the Sind; but it would give a permanent full supply for the Sukkur, and, with a new head or feeder from above it for the Ghat, would convert the latter as well as the former into perennial canals.
- 15. Attached short No. 2 shows the hydrogrophs of the river, after construction of the weir of Snkkur, and the Sind Conol, as compared with averages of the last ten years.
- 16. Sheet No. 8 is a general map of the country, showing weir site, lines of protective cubankment up-streem, and alternative lines for feeders of the Ghur Canal. The latter have been shown without any preparatory survey of the country, and are, of course, only approximate; but they serve as the basis of an approximate estimate of cest.

- 17. The first difficulty that arises is to select a suitable bend for the Ghar feeder. It must, if possible, be placed near the weir to secure its permanency; and with this object it will be advisable to pravide under-studees on the Sukkur side of the weir itself. There will probably be some difficulty in this, and it may have to be combined with a new head for the Sukkur Canal, but no definite opinion can be expressed on this point until proper surveys have been made and designs considered. Plou sheet No. 4 is the only information on the probable which gives useful infurmation on this point. It is probable that a suitable regulator in rock can be designed. If not, it will be necessary to consider the olternative or placing the regulator in the band line to the westward, but this would probably necessitate permanently maintaining a suitable dredger to keep open its freder channel from the river.
- 18. This ulternative would, however, have the very serious objection that the in-drought of such a large volume as this ennal would carry, namely, 6 to 7 thousand outle feet per second, might seriously endanger the safety of the hand itself, and also tend to encourage the admittedly possible estats the hand itself, and also tend to encourage the admittedly possible estats the hand itself, and also tend to encourage the admittedly possible estats at all likely to occur under existing conditions, with river bed levels at Sukkur well below the surrounding country; but, with the altered conditions of a weir blocking the lower levels of the discharge section of the main channel, it is not at all difficult to consective circumstances which would render the turning of the river not only quite possible, but probable. For instance, I believe, while there should be no difficulty in constructing suitable river embankments up-stream of the weir to withstand any chance of being breached merely by water pressure, that, if the river happened to take a decided trend towards the right bank, the correction of this tendency with raised bed level at the weir site might involve an expenditure of cnormous sums in the maintenance of suitable training and protective works, which, if onsuccessful in the early stage, would threaten disaster to the whole scheme.
- 10. I might dilate at considerable length on the possible dangers the river might threaten with altered conditions of bed such as have been considered up to this point, but it will be sufficient to state that, with the small amount of consideration I have been able to give the scheme up to the present. I would not no prepared to recommend the construction of a solid weir up to the level of 3 feet on Bukknr. This height has been chosen for the purpose of preliminary calculations of flood levels, etc., merely because at first sight it seemed suitable for that purpose.
- 20. The obvious conclusion is under-sluices in the weir must be provided in order to prevent interference with existing conditions of flood and water levels os little as possible. Whether suitable sinices can be built at the dopths necessary to secure this object is not so cavily unswered. It is a most interesting subject for consideration and discussion, but for the present I propose to proceed with my general review, assuming for the time being that the engineering difficulties are surmountable.
- 21. Estimato.-The project will include the following:-
  - (1) A weir or dum across the river so designed with under-slaices as to interfere with the height of flood discharges as little as possible, and also provided with under-slaices on both the Sukkur and Rohri sides of the river to secure a soon in front of the heads of the Ghar and Sukkur Canols on the Sukkur side and the head of the Nara Sapply Channel on the Rohri side
  - (2) A lock on the Robri side of the river for the pussage of boats and stemmers.
  - pussage of boats and steamers.

    (8) Protective embankments on each side of the river up-stream of the weir, suitable cross section, to safely withstand continued water pressure due to the maximum flood. The section chosen is as follows:—Top bank of 10 feet; top width at 6 feet above flood level; water and outside slopes 4 and 3 to 1, respectively, with an extra berm of 20 feet width at level of 2 feet below top water level added to the outside of the section.
  - (4) Head regulators for the Sukkur and Ghar Canals.
  - (5) Fcoder for the Ghar Canal, capoble of earrying a supply of 7,000 onbie feet per second.
- 22. The cross section for the weir has 16 feet width at 3 feet above the zero of the Bukkur gauge with down-

stream batter of 1 in 4 for a depth of 20 feet, and below that an increased batter of 1 in 3, which gives a width of 52 25 feet at 30 feet below the Bukkur rero. Allowing 2 feet for foundations, the whole quantity of masoury taken solid up to 3 feet on the Bukkur gauge amounts to 1,123,776 cubic feet. The openings for under-sluices will save at least half of the quantity above the foundations, but, to provide for a better class of facings, quoins, etc., at openings, one-third only is deducted. The total quantity up to 3 fact on the Bukkar garge will then he \$21,269 cubic feet, which is estimated at a rate of Rs. 150 per 100 cubic feet. Excavation for foundations is also taken at this late. Both rates are practically dauble those at which the same classes of work could be done above water, and should be sample in any circumstances, even under compressed insame classes of work could be done abare water, and should be ample in any circumstances, even under compressed nir-Tag fank well is esparately estimated. Above 3 feet, for estimating purposes, the weir wall is taken solid as was done below that level to simplify this approximate estimate. A 400,000 are allowed for under-sluices. Lump sums are provided for the lock and regulator. The Ghar feeder is taken as a canal, 220 feet in width carrying 11.75 feet of water for its whole length, half the length being taken 7 feet in embaakment and the other half length altogether in cutting.

#### 23. The estimate works out as follows :-

	Rs.
Freliminary Expenses, Survey, etc	50,000
Land Compensation	3,40,232
Weir	29,88,970
Lock	5,23,000
Protective Embinations	11,42,576
Regulator, Sukknr and Ghar	5,25,00
Feeder for the Ghat Canal	18,23,581
Total Works	72,05,959
Establishment at 213 per cent	15,68,532
Tools and Plant at 2 per cent.	1,43,907
Leave and l'easion Allowances at 11	•
per cent. on establishment	2,19,590
Interest during construction .	7,52,500
Grand Total, all Charges .	99,81,838
Or. 505-	
Wurks	73,60,000
Otler Charges	26,52,000
GRAND TOTAL .	99,52,000
Say	1,00,00,000

21. Recenue Return.—Mr. Tupper, Acting Collector of Larkana, has written a note on the expected additional area which will be cultivated, if the Ghar is converted into a percannal causal with feeder from above the weir site. He asthmates the additional revenue expected as follows:—

		Rs.
On Sakl ur Canal— ita'ndero Tabika On Ghar Cau il—	•	20,000
Kambar Taluka from Rs. 50,000 Rs 70,000, sav Nasirabud Taluka from Rs. 20,000	•	60,000
Rs. 49,000, say Lulkana Taluka	•	35.000 20,000
Son hern part of Palodero Taluka Toras	•	15,000

25. He, however, almits that he may have under-estimated the figures. I think that this is probably the case, especially when one examines the variation in the revenue realised on the Subkur and Ghar Capals for the past ten years. The figures have been as follows :

Canal.	Average realised for 10 years.	Maximum resh- extions	Minnoun reili- ertiors.	
Sakkur Canal	2, 15,359	3.13,422	1,(0,052	
Glar Caral	7 22,193	8,12,637	8,53,574	
Torth.	1'.67,552	11,57,219	1.70,230	

The difference between maximum realisations and averages should, I am of opinion, be taken as due to this project, because by construction of the weir both causis will be readered perennial and independent of the river, and the figure which represents this should be added to Mr. Tupper's estimate, which relates only to lands not at present brought under cultivation. under cultivation.

20. The figures of revenue due to the work would then be as follow :

					Rs.
On existing areas		•			2,19,900
On new areas,	•	•	•	•	1,50,000
		T	OTAL		3,69,900

27. The Sind Canal would also receive benefit, though perhaps small; so also would the Rukan, Rani, Sauro and Jamb an the Robri side, all aithm a distance of len miles above the weir. Unfortunately, I know nothing of these canals, which seem to be merely small canals taking off through sluces in the bund line, but owing to the large increase in higher supply which should be available at their heads it is probable that, taken together, they may be safely calculated to yield an additional revenue of at least half a lakh of rupees. The Siad Wah and other bind sluices on the right bank may also be credited with another half a lakh of rupees, and adding these figures to the previous expected realisation from the Sukkur and Ghar brings the total to Rs 4,69,900.

28. It is equivalent to n return of 6:40 per cent. on works and 4:70 per cent, on works and nil other charges, including interest, and, as this revenue return takes no account of passible advantages and proportional revenue which would result on the Jamino and Ea tern Nara sistems, it would appear that the project in north fully investigating, if the Engineers consider it practicable to construct a weir at a cost anything near that at which it has been approximately estimated.

29. This points ta the advisability of first getting a reliable survey of the bottom of the river, but there is no time for this before the Irrigation Cummission meet at Sukkur, and it would help greatly in the solution of questions likely to arise if, while there, the special Commission would discuss the practicability of constructing the weir or dam, assuming that the cross section is even more unfavourable than is shown on the section submitted.

30 Statements showing results of irrigation on the Sukkur, Ghar and Sind Canals are attached for reference.

#### No. III .- MR. J. L. RIEV, I.C.S., Collector of Shikarpur.

Khan Bahadur Pir Baksh, the Deputy Collector of Rohri, to whom I showed the papers, estinantes the increase of revenue in Rohri at half a lake He knaws the country better than I do, but I am inclined to think his estimate rather too liberal. The only canals affected on that side (apurt, of course, from the Nara supply channel) are the Jaaib Wahand Korai. They are small canals, and nothing much is to be expected from them, while I doubt whether any important system of canals is possible. The cost would be prohibitive, and there is not much unbruken ground.

The floods in the fishe would extering to make the made manner.

The floods in the Guhe would certainly be made more certain and of greater volume, and there would be a good deal of rabi. But it is very difficult to give estimates. What would really happen is that there would be more good years in Robri than hitherto.

As regards the Sukkur Division. I attach Mr. MacMunu's letter. Perhaps, he rather under-estimates, or rather, I should say is wrong in making no estimate at all. I doubt, however, whether even with a good supply in the Suid Canal, the extensive lands near the Jehan Wah in northern Nau-habro could be irrigated from that canal.

Ann-hauro could be irrigated from that canal.

The fact is that the principal result of a weir will be to give an early rise, a steady river, and a late fall. Now, when the croys fail, Government only bears an infinitesimal proportion of the general less; so when crops are flourishing, the gain to Government (in rupees) is impreceptible almost compared to the general gain. Ultimately, no doubt, them will be actual pecuniary gain in the shape of higher rates of assument, but at the beginning, when there are no large tracts of virgin soil to be brought under cultivation, an immediate return cannot be counted on.

Not printed.

No. IV.-MB. V. C. MACMUNE, I.C.S., Assistant Collector.

I do not think Mr. Dawson's sohemo is meant to benefit I do not think Mr. Dawson's solume is meant to behelf this division much, and I do not suppose it would do so. There is a good existing supply on all the three canals—Sukkur, Slud, Begari; and the main effect of Mr. Dawson's solume would be, perhaps, the removal of the restriction on the first of these. There is land, as Mr. Giles said, in the Drakhan-Madrji region, also about Ruk; but there is no extended area uncultivated, and uone over which there is an actual look of water with the exception of the strip it was netnal lack of water, with the exception of the strip it was proposed to irrigate by the new Shikarpur Canal and the northern pieces of the Nau-hahro Taluka to the west, which are on the tail of long kurias from the Begari. The Sukkur Canal would, no doubt, benefit from having a really permanent rabi supply, but I cannot put the benefit in figures.

On the whole, I should say that, while this division would profit, the profits would be small compared to that

elsewhere, and would consist principally of all vantages it is difficult to express arithmetically: e.g., the one that would accrue from raising the height of water at the beginning and end of the immedation, and thas making the supply

uniform.
One is forbidden to discuss the practicability of the scheme. But I would like to point out that the district between Mr. Dawson's "proposed line of bands" and the Sukkur-Begari is a very good piece of country—well populated, well enliveded. What is Mr. Dawson going to do with it? If he is going to flood it, he should be told to stop at once. But I suppose he does not mean to flood it. Why a separate supply channel? It was long ago suggested to enlarge the Sukkur Canal and feed the Ghar from it.

No. V .- Mn. H. G. PALLIEER, Chief Engineer, Indus Right Bank Division.

#### A .- SIND CANAL. Acres. 169,000 Culturable area commanded Maximum irrigation estimated by the Exocutive Engineer 24,000 75,000 Area remaining

The estimated "maximum irrigation" is about 66 per cent. of the culturable command, which agrees fairly with the combined Sukkur and Ghar Canals' figures, for which seo B of this Note.

Given a higher supply in the Sind Canal, the Executivo Engineer estimates that one-fourth of the "remaining area of 75,000 acres will be irrigated, or, say, 18,800 acres, which at Rs 3 per acre will give a gross annual revenue of Rs. 56.400.

B.—SUERUR AND GHAR CANALE—	Acres.
Existing culturable area commanded by the two canals	555,000
Of which average irrigation of lost 10 years (up to 1900-01).	
Actual average irrigation equals 58 por	-020,000
cont. of coulturable command.	
Maximum area irrigated in 1894-95	390,000

was Equal to 70 per cent. of the command.

The above "oulturable area commanded" includes the Shahdadpur and the northern portion of the Ratedero Talokas, which are watered by the Sakkar and Ghar Canals with great difficulty and at the expense of heavy silting every year. The contour survey has cenelusively shown that this particular part of the country must be taken over by the re-modelled Begari Canal, which can easily and naturally deliver ample supplies, the Begari water being at a higher level than other that of the Sukkur or the Ghar.

Gpar.					Acres.
Culturable are	a comma	nded	•	•	555,000
Deduct— Culturable are	s which	will	be tra	ns-	
ferred to t	ho re-n	odelle	d Beg	ari	
Canal	•		•	•	135,000
Net culturab			_	•	420,000
Culturable a	irea ava	ilablo	in Gai	ibi	
Dero Jugir Do	do .	Mir	zapur	•	81,000 18,000
Do	40		ou par	•	20,000
Total caltural		o bo co	omman	ded	519,000

Of the 420,000 acres remaining within the Ghar and Sukkur systems, 58 per cent. seems to be actually irrigated. This, if correct, is a very high percentage indeed, and there seems to be no possibility, therefore, of extending irrigation within the limits of the present command.

Thore are, however, 102,000 acres of jngir land which could be brought under command of the (extended) canals. Calculating on the high proportion of 50 per cent, there wend be 50,000 acres of new Irrigation, yielding, say, Its. 50,000 gross anaual revenue to Government in the slupe of Hakabo.

But it must be remembered that the Ghar Canal when re-modelled, after relief of its impossible duties in Shalidadpur and the north, will be quite enpable of watering the jagir country on the west during the klurif season, unassisted by any new Foeder Canal from the lake caused by the Bukkur Weir.

The proposed Feeder Canal would certainly raise the rabi level of the Gher to something like the present kharif level, and would therefore secure the extension of rabi cultivation. But the existing irrigation is already 58 per cent, of the whole cultivable command, and it is difficult to cent. of the whole enturable command, and it is difficult to see how extension of irrigation can be brought about. The only result of increased rabi supplies would practicably be the substitution of rabi for some of the present kharif entiration, and it is doubtful in the first place whether such substitution will be effected by the people to any considerable extent, and in the second place whether such substitution would secure any increased revenue.

In his Note, the Collector of Laskana estimates the annual increase of revenue due to improved sapplies brought down by the proposed Feeder Canal from the Bukkur Weir as under :-

(i) Ratodero Taluko, north	From Rs. 15,000	To Re. 20,000
(ii) Kambar and Nasiraban, do	50,000	70,000
(iii) Larkana do.	18,000	20,000
(iv) Ratodero Taluka, south	15,000	15,000
Total .	83,000	1,05,000

The north Ratedore figures have been excluded from the total, as that land will be taken over by the re-modelled Begani Canal.

The estimate scems a cautions one, and agrees with my general view of the probabilities.

C REVENUE DUE TO BUERUE WEIR-	Rs.
A Sind Canal	56,400
B.—Sukkur and Ghar Canuls.— The Collector osti- mates about	1,00,000
The Gaibi Dero and Mirzapur jugits will bring in Rs. 50,000, but the re-	•
modelled Ghar would water this nrea without assistance	50,000
Total Gross Revenue, say .	2,00,000

Against this must, in fairness, be set the loss of revenue from the land thrown out of onlivation on both banks of the river by the raising of the celd weather river level by the proposed Weir. It is true that such loss of revenue will be allowed for in the Weir project as an indirect charge under "Capitalisation," but none the less the revenue will bo lost to Siod, and most he fairly recked as a set-off against the increased revenue from the Sind, Sukknr, and Ghar Canals systems. What such loss is likely to be, there are at this stage no figures to show.

#### No. VI .- Mr. J. H. E. TUPPER, Collector of Larkana.

- The scheme would affect 4 talakas in the Larkana Collectorate - Ratedere, Kambar, Larkana, and the northern pertion of Nasirabad.
- 3. Improved supply in the Sakkur Canal will affect the northern pertien of Ratodeto Taluka only.
- 4. Improved supply in the Ghar will affoot the southern portion of Ratodoro Talaka, the whole of Kambar and Larkans, and the northern portion of Nasirabad.

- 5. It is apparent, therefore, that the offeet likely to be exercised by the scheme on this district will be practically confined to the new commanded by the Ghar system.
- contined to the new commanded by the Giar system.

  G I may observe, in passing, that the Sukkur Canal shready gives both a kharif and a rabi supply, and that it is, I am told, eapable of giving full supply with Bokkur Esuge at 9 feet, riz, 4 feet under what is usually described as "fair irrigation level" for other canals. In spite of this, the sopply is at present unequal to the demand. It would appear, therefore, that what the Sukkur Canal stands in med of is increased bed width and a larger volome of water, and it is not clear from Mr. Dawson's letter that those remedies form any part of the Bukkur Weir scheme. Without this, the mero raising of the water level at Bukkur to 125 feet all the year round will exercise a comparatively trifling effect upon the canal, so far at least as it affects this district. If the carrying capacity of the caoal can be increased at the same time, and the canal kept working during practically the whole year (as it was last year and is likely to be this year). I should estimate the yearly increase of revenue from the northern portion of the listeder. Taluka at Es. 15,000 to Rs. 20,000, not more, since the waste area in that portion of the taluka capable of being brought noder entiration is limited.

  7. Turning to the Ghar system. The conditions on
- 7. Turning to the Ghar system. The conditions on this canal are widely different from those of the Sakkur. The latter is a "perennial" emal and gires a full supply with a comparatively low river: the Ghar is not a "perennial" canal and can only give full supply with a high river. The Ghar is, therefore, likely to benefit to a far greater extent than the Sakkur by acquisition of a head above the weir commanding a permacent 12-feet supply.
- shove the weir commanding a permacent 12-feet supply.

  8. The mere conversion of the Ghar into a "perennial" canal is not likely of itself to greatly increase the area under cultivation, but if the surface level of water in the canal em he raised some 3 or 4 feet (the hed level remaining the same—this implies a greatly increased volume of water also), the whole system is capable of great development. With the Ghar, the main point would appear to be raising of the surface level. This is all-important, her use the major portion of the waste land available is capable of being brought under cultivation only if it can command a mok" (flow) supply. This land, fur the mest part, contains a hency admixture either of salt or of sand. Such land can be rendered fit for cultivation with comparative case with a plentiful "muk" supply; but if a laft supply unly is available, the task would be an impossible one.
- 9. The land which is locally known us "axil kalimti" and as "wariasi" may be left out of calculation, since it would require a grent number of years and an unlimited supply of water to make it fit for the plough.
- 10. Other varieties of these two descriptions of soil, which contain respectively a smoller admixture of "kalar" and of sand, can be converted into good land with more or less trouble in proportion as the admixture is greater or smaller. The only requisite is a plentiful "nock" supply. The variety known as "kat kalar "especially is capable of being quickly converted into what is known as "dangachi"—an excellent rice soil.

The randy soils, on the other hand, from "drib" down-wards, are expable of conversion (given a "mob" supply) into the description of "latashi" or "latinri," knewn respectively as "gasari" and "drasari"—both excellent light soils, though not soited for rice.

- II. Turning now to the talukas affected. Kambar and Nasirabad both coutain large creas of saltish or sandy soils expable of conversion as above described into arable land—notably Kambar. I should say that the cultivable area of Kambar Taluka is capable, under the conditions described above, of an increase equal to one-quarter of the area at present cultivated, bringing in between Rs. 69,000 and Rs. 70,000 per annum as additional revenue.
- 12. As regards Nasirabid (of which the northern portion only depends on the Ghar), I have some hesitation in expressing an opinion, since it is three years slace I was in charge. I should say that the taluka might be counted on for on increase of from Rs. 30,030 to Rs. 40,003 owing to a greater area under cultivation.
- 18. Larkana Thinks is already very heavily cultivated, and I do not consider it would be safe to speculate on an increased area ender caltivation of more than six or seven thousand serve, representing an increase of, say, Rs. 20,000 in Land revenue.
- 14 The southern half of Batedero, which depends on the Green head, has softered severely of late years, owing

- to the low surface level of the water. With a mouth above the weir, this would be remedied. I do not, however, think that the additional nrea of land which could be given out for cultivation would amount to more than 5.000 acres, representing a revenue of about Rs. 15,000.
- 15. I may possibly have somewhat under-estimated these figures, but I should not myself care to speculate on an increase of more than 14 lakes as the resolt of new land brought under cultivation in this district by the proposed scheme.
- 16. This, of course, does not take into consideration the greater profit that would accrue to the cultivator from land already under cultivation, owing to his being able to calculate upon a certain, instead of n precations, supply. This would doubtless mean ultimate enclamacement of rates, and hence greater revenue from the whole cultivated area on the oanal assems concerned.
- on the canal sistems concerned.

  17. I would notice one more point. Mr. Dawson writes that the wew scheme would render the Ghar practically independent of changes at its mouth. From this, I infer that the existing Ghar and Ford Wah mouths will remain, and that the mouth above the weir is intended to be merely supplementary, and will not be designed to carry the full supply required for the whole canal. If this is so, there cannot, I presume, he may intention of greatly raising the surface level of the water in the canal, since, if this were done, the exiting Ghar and Ford mouths would both be convented into ecoapes. If the surface level is substantially raised, both Ghar and Ford mouths must cesse to exist as feeders. As I have pointed out, my celenlations of increased revenue are based on the assomption that the sorface level of the water in the canal will be raised 3 or 4 feet. If this is not the case, the increase of revenue is not likely to be mere than one-third of what I heve stated.

### No. VII .- MB. H. G. PALLISER, Chief Engineer, Right Bonk Division.

There are no great expansos of what may be called virgin colturable laod in this Divisioo awniting the construction of new canals, such as was the case in the Left Bank Division previous to the commencement of the Jumr. o Canal, and soch as may yet remoin in the Hydernbad and Thar and Parkar Districts. Speaking broadty, all the culturable waste land to the Right Bank Division can be communded and watered by extensions of existing canals. These may be teken separately in geographical order, commencing from the north.

- 1. Desert Canal.—The "re-modelling" of this canal at a cost of about 18. 11,00,000 will, it is hoped, be completed in time for the inundation of 1902. When completed, this canal will, it is believed on present information, reach its full development, and be capable of irrigating the whole of its command without probability of any feasible extension for years to come.
- 2. Unhar Canal.—Beyond extension of distributaries for watering interior command, not much can be done, as the land at the tail comes within the influence of either the Desert or the Begeri Caunl.
- 3. Begari Canal.—It is proposed to entirely "re-model" this canal and to extend the tail distributaries so us to irrigate the Shahdadaur und parts of the Raiodero Tolukus, which have hitherto suffered from inadequate supplies from the Sukkur and Ghar Canals. The Begari will deliver higher water than either of these two eausis, which take off much further down the river.
- It is also proposed in the "re-modelling" scheme to investigate the possibility of taking in a larger partion of the Khelat territory for irrigation seross the border near Khairo Garhi.

Sorreys are proceeding, and will, it is hoped, be completed this next season.

- 4. Proposed Shikarpur Canal is an alternative to the widening and extension of the Begari Canal, the merits of the twn proposals being judged on the results of the zurveys now in hund.
- 5. Mahi Canal (on the left bank of the river, but included in the Hight Bank Division) will be completed next season at a cost of about Rs. 7,60,000. When completed, it will probably be found that there is a good deal of land at the tails of the Delra, and of the other distributaries of the new Mahi Wah, which could be brought under command by extensious. This would involve a fresh sarvey and a new estimate, and can be seen to next season.
- 6. Sind Canal.—No extension is possible, beyond that of the distributaries, as the tail country enture within the sphere of either the Begari or the Sukkur Canal.

- 7. Sukkur Canal.—Some of the country at the tail, at present watered with difficulty, and at the expense of much silting, will be taken ever by the re-modelled Begari. This will relieve the Sukkur, and enable it to extend its sphere of usefulness in the southern direction, thus in turn relieving the Ghar.
- 8. Ghar Canal is proposed to be entirely "re-medelled," and the preliminary contour survey was commenced last season and will, it is heped, be completed by next hot weather. The Shahdadpur country in the north-west will be taken over by the Degari Canal, which delivers water there at a higher level, and the Ghar will then be fitted to carry out its full legitimate duties to the southwards, where the water-supply is under present conditions defective. Extensions will also be worked out so as to include the Jaibi Dero and the Mirzapur jagirs, situated in the west, under the hills, and littlerto not served by any irrigation system. The culturable area of these jugirs is believed to be about 100,000 acres.
- 9. Western Nara,—Complaints have been rife for many years past of the unsatisfactory working of this great cause, and proposals have from time to time been made for partial improvements, some of which have been carried out in fairly recent times. But experience does not encourage the continuance of such patch-work, and it is now proposed to institute an exhaustive enquiry into the whole system of irrigation, commencing with the indispensable contour survey, to show how the lords of the land his everywhere, and then to proceed cautiously and scientifically with a complete scheme for re-modelling. A history of the canal has just been prepared, and an estimate for the contour survey is being submitted for the sanction of Government.

There are large areas within the system which receive no supply of water at all, and others with a defective supply. There is no question of extension, but of construction of now branches and re-arrangement of old ones, so as to make a complete and homogeneous system of the whole Western Nara irrigation, from the mouth near Larkana down to the Mauchar Lake and Schwau.

10. Karachi Canals.—From Soliwan to Kotri, the strip of culturable land between the river and the hills is narrow and there is no scope for any but very small extensions.

Below Jerruck, the country opens out into the deltnic formation, and both banks of the river are included in the Right Bank Division.

On the loft bank, enquiries are proceeding for extensions of two small canals (Laikpur and Ali Bahar) near the Pinysri, which will bring, perhaps, 10,000 acres into cultivation. Further south, near Sujawal, there is a proposal for a new small canal (called Gaugri Chalatbo) which will take in about 12,000 acres of waste land; and still a little further south it is proposed to extend the Satah Canal to irrigate 6,000 acres of new land, as well as to improve the supply to existing cultivation.

On the right bank of the river, there are no actual proposals us yet for extensions, but it is thought that there will be no difficulty in bringing a few thousand acres of fresh land into cultivation.

11. The order in which the above schomes may be considered is very much the order in which they have been enumerated, except that the small projects in the Karachi Canals District can be worked up simultaneously with, but of course independently of, the larger schemes of Upper Sind.

#### Statements laid before the Commission by the Commissioner in Sind.

Δ.

Statement showing particulars of total Area, cultivable Area, and occupied Area for the Province of Sind from 1870-71 to 1899-1900.

				OCCUP	,	Unassazird		
Year.	Total Area.	Cultivablo Area.	Alienated.			Total of Columns 1, 5,	Unoccupied Land in 1898-99,	cultivable land in 1893-99.
			7111ettase ui	Caltirated.	Fallow.	and 6.		
1	2	3	4	5	6	7	8	9
1870-71 1871-72 1872-73 1873-74 1873-74 1873-76 1876-77 1877-78 1878-79 1878-79 1878-80 1880-81 1881-82 1882-83 1883-84 1883-84 1883-85 1885-86 1886-87 1887-89 1893-91 1893-91 1893-91 1893-96 1895-96 1895-96 1896-97 1897-98 1898-99 1699-1900	25,074,696 33 26,091,171 30 28,106,569 30 28,985,315 6 20,852,543 5 29,975,561 32 29,972,335 10 29,972,653 23 29,931,985 0 29,959,479 13 29,953,568 26	16,055,720 6 10,651,674 33 12,171,559 8 14,101,834 85 14,852,731 9 14,947,344 88 14,399,031 17 14,983,311 37 13,866,814 32 13,944,791 32 13,966,891 18 14,072,937 5	1,129 063 22 1,129,976 35 1,123,737 15 1,307,379 15 1,300,688 1 1,297,458 1 1,297,458 15 1,291,176 12 1,290,688 15 1,231,598 15 1,277,239 28	1,076.598 0 2,012.863 0 2,012.863 0 1,870.211 0 2,514.500 0 1,870.211 0 2,514.605 0 2,417.614 25 1,740,051 20 2,496,614 15 2,90.5,101 17 2,605.264 1 2,605.267 13 2,749.615 22 2,615.267 13 2,749.615 22 2,615.267 13 2,749.615 22 2,615.267 13 3,332,454 12 2,836,629 13 3,332,454 12 2,836,629 13 3,332,454 12 3,762,032 11 2,837,629 13 3,332,454 12 3,762,032 11 2,837,631 30 2,831,636 10 3,171,060 27 2,669,163 39	619,032 11 976,033 4 6976,033 4 6976,033 4 6976,037 4 1,038,104 1 1,038,104 1 1,315,451 5 1,772,521 05 2,115,191 2 1,636,266 10 1,832,103 2 1,636,266 10 1,832,103 10 2,700,810 91 2,700,810 91 2,912,152 33 3,512,114 14 0,138,725 0 2,912,362 3 3,388,174 17 3,567,787 38	\$,000,602 31 \$,472,317 19 \$8,672,317 19 \$8,712,930 10 3,712,930 10 3,791,927 21 3,619,663 23 4,627,7085 36 4,522,110 17 4,700,758 25 5,466,320 15 7,413,971 17 7,339,016 25 7,413,971 17 7,339,016 25 7,487,727 30 7,810,493 0 7,810,493 0 7,655,630 13 7,701,386 15 7,880,117 3 7,810,651 32 7,711,161 25	829,397 36	5,991,411 GG

B.

Statement showing net Area cropped, Area irrigate l, and other particulars for the Province of Sind from 1885-86 to 1899-1809.

Year.			Inn	ropro- unitri- ea.		
		Net Area eropped.			Total Arca irrigated.	Balanco re Frutung un guteil Aren
1		2	3	4	5	6 (a)
1845-86 1186-67 1887-68 1856-89 1859-90 1590-91 1491-92 1892-93 1893-94 1894-95 1895-99 1895-99 1895-1930		1,469,764 1,467,468 1,467,468 1,608,183 2,608,760 2,684,810 2,714,676 8,608,291 2,684,168 8,226,681 3,690,182 3,690,182 3,781,614	1.238 010 1.334,662 1.436,9 14 1.721,316 2.014,911 2.001 542 2.209,203 2.300,471 2.600,459 2.000,271 2.734,107 2.734,107 2.734,107 2.734,107	225,540 226,541 204,697 271,919 115,549 450,569 117,956 462,649 123,651 123,551 123,551 123,551 123,551	1,466,509 1,551,216 1,611,301 1,206,258 2,761,713 2,304,161 2,7126,000 2,618,220 2,618,220 2,618,220 2,618,220 2,618,220 2,618,220 2,117,621 2,117,621 2,118,020 2,611,117	\$,185 16,262 6,257 3,6,015 8,10,018 3,20,27 417,776 417,776 420,911 106,8 522,816 531,650 136,667

<sup>(</sup>a) Column 6 includes Barani cultivation in the Desert and throughout Sind.
Figures for That and Parkar are not available.

C.

Statement showing the extent to which each of the principal Products was oultwated in the Province of Sind.

Yesz.	Year		CEI	REALS.			Other	Total Area	Deduct	Net crep-
	Rice.	Wheat.	Juari.	Bajrî.	Others.	Total.	Crops,	enitivated.	eropped Area.	ped Area.
1	2	3	4	5	6	7	8	9	10	11
1551 86 1556 87 1557 63 1655 83 1653 80 1590 91 1591 92 1592 91 1592 91 1593 86 1594 97 1593 86 1594 97 1593 86	422,405 436,063 419,193 633,917 656,541 706,167 682,206 611,796 697,433 650,086 651,573 731,539 898,269 898,269	223,914 193,769 200,822 231,453 337,271 445,775 446,704 547,813 4610,416 361,923 368,629 368,629 372,785	312,633 391,731 435,239 511,568 181,938 462,450 452,466 CO,535 457,310 457,310 741,714 711,713 511,613 453,506	210,025 220,412 260,058 505,421 765,336 740,533 696,F19 830,510 750,424 749,839 750,450 750,251 760,956 255,200	10,754 9 £10 12,455 16,457 82,575 27,682 27,687 86 £31 29,819 10,837 13,710 14,614 62,959 11,059	1,179,553 1,274,755 1,857,697 1,858,696 2,122,761 2,851,697 2,951,882 2,641,927 2,459,359 2,612,632 2,158,021 2,620,051 3,052,256 2,652,657 1,793,001	439,360 415,629 525,312 616,912 748,757 770,995 687,650 729,033 811,552 1,081,884 621,032 761,460 1,012,875 733,973 1,296,154	1,618,713 1,690,551 1,753,278 2,552,278 3,175,231 3,122,692 2,945,542 3,101,689 3,300,692 3,731,516 3,731,516 3,731,516 3,731,516 3,731,516 3,731,516 3,731,516 3,731,516	149,927 123,116 103,603 159,995 222,758 235,415 235,415 236,901 231,609 261,201 131,668 165,120 222,110 228,674 215,171	1,4*9,754 1,567,189 1,619 556 2,6*9,153 2,9*5,763 2,5*5,763 2,710,127 3,666,234 2,470,225 2,655,189 3,226,631 3,6*6,766 2,781,014

D.

Statement showing assessed Area on Canals and actual Cultivation in Government Land.

	Year,		Asresed Area oo	Acteal ('Tl	
•	J(m,		Canals.	Arca.	Assessment.
1890-81 1891-82 1882-83 1893-84 1894-86 1895-86 1956-87 1857-88 1858-89 1859-90 1891-92 1892-93 1893-96 1894-95			 1,000,155 1,501,010 1,600,513 2,055,777 2,005,146 2,030,817 3,161,457 3,161,457 3,661,769 3,661,769 3,663,505 3,630,101 3,035,745 3,035,745 3,035,745	1,328,662 1,418,957 1,508,292 1,362,107 1,596,270 1,582,722 1,593,066 1,695,705 1815,858 2 100,801 1,955,140 1,949,717 2,184,309 2,16,625 2,257,335 1,790,390	3,198,144 8,747,828 3,525,448 3,613,253 4,180,237 3,950,475 4,124,748 4,195,560 4,703,592 5,324,055 5,063,329 5,116,667 5,665,150 5,710,381 6,353,063 4,840,656
1896-97 1897-98 1898-99 1898-190		•	 3,035,423 4,139,051 3,981,964 4,242,797	2,109,057 2,625,039 2,175,912 2,254,553	5,957,737 6,700,922 5,912,101 6,891,712

E.

Statement showing Cultivation on Wells in the Province of Sind during the twenty years commencing from 1880-81 and ending in 1899-1900.

Year.		No. of Wells.	Area.	Assessment,		
	1		2	3	.4	
1880-81				8,747	21,085	57,779
1881-82				2,320	12,676	33,068
1882-83				1,976	12,470	28,315
1883-84				2,970	17,987	46,701
1884-85				2,805	14,815	82,650
1885-86				2,089	13,597	29,505
1586-87				2,615	16,393	40,833
1887-88				2,610	17,091	39,175
1889-89				3,222	19,582	45,261
1889-90				2,387	13,148	31,820
1890-91			•	2,300	12,864	31,413
1891-92	•	•		3,291	19,373	49,927
1892-93				1,525	7,029	18,788
1893-94				1,620	8,471	23,549
1891-95		•		1,012	4,774	11,512
1895-98				4,465	24,355	69,980
1896-97				4,021	21,130	58,521
1897-98				2,202	11,092	29,913
1698-99		•		5,060	27,700	78,318
1899-190	o o			5,617	21,722	54,962

F.

Statement showing Cultivation on Canals and other Sources independent of Canals (such as River-spill, Barani, etc.,)
in the Province of Sind.

				Tonia Co	LTIVATION.		1	DETAILS OF CULTIVATION.					
	Year.			1011L CC	TIMATION.	0 x C	Ayars.	0 a 7	Velle.	OTRYR S	OURCES,		
				Arca,	Assessment.	Aren.	Assessment.	Ares.	Asserament.	Arca.	Assessment.		
	1			9	3	4	5	G	7	8	D		
				Acres.	Rs.	Acres.	Bs.	Acres.	Rs.	Acres.	Rs.		
1891-93 . 1892-93 . 1893-94 . 1894-95 . 1895-96 . 1896-97 . 1897-98 . 1898-99 . 1899-1900	•	•	•	2,626,474 2,997,226 2,905,763 3,204,142 2,204,671 2,771,947 3,500,088 2,820,400 2,559,784	61.33,667 70.96,898 68,29,657 76,81,769 66,11,023 70,26,834 81,74,356 66,51,318 70,13,816	1,949,717 2,184,368 2,1e6,825 2,357,438 1,706,390 2,109,007 2,525,039 2,175,912 2,286,853	51,46,667 56,95,480 57,10,381 63,58,905 48,40,609 59,57,737 67,90,224 59,12,101 68,01,712	19,373 7,029 8,471 4,774 24,355 21,130 11,092 27,700 21,722	49,927 18,788 23,649 11,513 69,080 58,521 29,013 78,318 54,062	657,384 805,829 710,467 841,930 473,917 641,750 963,957 616,788 251,209	9,87,073 13,82,630 10,95,727 12,16,842 7,00,434 10,10,676 13,54,219 6,90,899 6,67,142		

Note. - The figures in Cols. 8 and 9 include cultivation in the Desert.

G.

Statement showing culturable Government Waste Lands in Sind and what they depend on for Irrigation according to the entries in the Settlement Registers as ascertained in 1890-91.

District.	Unocenpicd assessed Land,	Unassessed caltivable Land,	Total cultivable Land.	Dependent on Canols,	On River.	On Wells,	On Barani,	Usprovided for.	Toinl.
		1898-99.					1890-91.		
Karachi Ryderabad Shikarpur U. S. Frontier Thar and Parkar (Desert excluded).	123,329 401,079 162,350 50,563 76,503	1,056,540 1,557,400 1,251,844 331,532 682,006	1,184,509 1,958,479 1,418,694 382,095 758,511	87,120 650,237 148,818 114,012 47,232	9,541 8,595 57,820 32,875	151  20	149,088 17,666 191,098 4,848	813,276 1,481,947 1,865,390 256,129 708,453	1,059,180 2,108,445 2,263,121 403,036 760,533
TOTAL .	818,826	4,878,823	5,697,648	1,047,428	108,831	171	362,690	5,075,195	6,694,315

H. Statement showing Gross Revenue, Remissions and Net Revenue for Collection for the Province of Sind.

Rs.   Rs.   Rs.   Rs.   Rs.	Year.	Total Land	Definct Remissions.	Ket Berenne for Collection.			T	OTIL ADVINCUS.	
Rs.	_	-		, Ltr	•	Improvement	Agriculturists Loans	Total.	
142,31,500		Rs.	Rs.	Rs.			1 71741	1881.	
1.000   1.00							Re.	R4.	Rs.
1.572-73					1670-71 .		1	· - · · · · · · · · · · · · · · · · · ·	
1873-75							11	- (1	1.900
874-76         37,85,517         1,04 101         35,91,436         1878-74         avalable separ-attly           876-77         42,25,029         1,04 101         35,91,436         1874-75         attly.           876-77         37,75,786         1,30,329         36,45,467         1876-77         1875-70           879-80         49,29,950         2,97,457         46,32,193         1877-78         3,000         75,413         78,4           881-82         49,07,505         50,731         41,02,710         1878-70         3,000         75,413         78,4           881-82         49,07,505         50,731         48,65,740         1,21,599         47,31,411         1881-82         4,200         43,171         47,3           884-85         65,83,425         1,83,087         54,00,388         18-2.83         52,05         29,213         33,4           886-87         57,96,510         1,70,409         56,26,101         1884-85         2,650         26,231         29,1           887-88         65,36,669         94,359         64,45,340         1885-86         6,485         20,145         25,6           889-90         77,98,652         3,77,937         74,20,715         1886-87         8,585								tion not	6,210
$\begin{array}{cccccccccccccccccccccccccccccccccccc$									19,66
876-77       42,20,20       4,11,222       35,01,17       1876-70       130,393       36,45,467       1876-70       20,8         878-79       49,29,950       2,97,457       46,32,193       1877-78       120,8       38,000       76,413       78,4         881-82       49,07,505       50,731       49,03,310       1878-79       3,000       76,413       78,4         882-83       62,09,697       2,46,886       49,62,811       1881-82       4,200       43,171       47,3         884-85       65,33,425       1,21,599       47,34,141       1881-82       4,200       43,171       47,3         885-86       65,07,310       2,01,637       53,56,473       1884-85       2,960       26,231       29,13         885-87       57,96,510       1,70,409       56,26,101       1885-86       5,495       20,145       25,6         885-89       65,30,689       94,359       74,53,30       186-87       8,585       15,025       23,6         889-90       77,98,652       3,77,307       74,20,715       1886-87       8,585       15,025       23,6         892-93       80,42,072       3,6686       56,40,250       1891-92       26,508       81,621       11						_			83,41
877-78							1	11	14,51
$\begin{array}{cccccccccccccccccccccccccccccccccccc$						_	1.3	11	
879.80						-	1.4	- 11	13,61
$\begin{array}{cccccccccccccccccccccccccccccccccccc$						•		75.413	78.41
$\begin{array}{cccccccccccccccccccccccccccccccccccc$						• •			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$						• •			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$						•			
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$\begin{array}{cccccccccccccccccccccccccccccccccccc$						•			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$						•			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	886-87		1,70,409						
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	887-88	. 58,49,461							
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	888.89 • •								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	889-90	77,98,652		74,20,715					
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	R90-91			73,69,144		• •			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		72,36,930	2,96,680	59,40.250		• •			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$			3,06,854	76,75,218		• •			
894-95		77.52,164				•			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		65 01 650				• •			
896-97		00 00 004				•			
\$5,05,080						•			
893-99	COR OO								
80,15,413 6,74,767 78,40,613 1895-93 20,014 2,50.0 1,88,916 02,024 2,50.0						•			
1855-05 1,00,010 02,054 1,00,0						•			
1899-1900   2,71,518   3,88,995   6,10,5		1 00,10,410	0,19,707	101201013	1895-9 <i>3</i> 1899-1900			3,38,995	2,50,0 6,10,5

<sup>\*</sup> For the Financial year 1807-93, no takent grant was made to Sind owing to requirements for the Famine districts in the Fresidency.

I.

J. Return showing the approximate Yield per Acre of the principal Crops in the Province of Sind (1892 to 1897) as ascertained from Orop-Experiments.

					7.4	ERAGE	OUT-TU	RN IN I	ds, per	ACRE	CROPPEI	) <b>.</b>		
Province.		IFCE.	U.S FRONTIER DIMERCE.			Shikarpur District,		Karacut District.		RIPAD BICT.	THIR IND PAR-			
			Irrigated.	Unirrigated.	Irrigated.	Volenigated,	Irrigated.	Unitrigated.	Irrigated.	Onterigated.	Irrigated.	Valerigated.	Irrigated	Valrrigated.
1	,		2	3	4	3	8	7	В	Đ	10	11	12	13
Rice Wheat Barley Juan Juan Bajri Gram Til Sagarcane Cotton, cleaned Rapo Seed	:	:	1,495 944 962 853 708 478 269 3,705 293 513		903 902 652 1,147 302 205		1,633 1,246 720 1,167 610 846 120	***  **  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  **  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  **  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  **	929 1,721 585 400 825 120 4,850		1,083 601 1,008 810 440 423 2,560 74 715	*** *** *** *** *** ***	1,386 560  516 393 492 426	*** *** *** *** *** *** *** ***

Reie.-Blee-la Shikarpur, the experiment was conducted on Segasti and in They and Parker on Beirio rice in 1597-88.

WITNESS No. 1 .- ME. E. F. DAWSON, Superintending Engineer, Indus Lest Bank Division.

- 1. Q. (The President)—I understand, Mr. Dawson, you are the Chief Engineer, Right Bank of this canal?—No. At present I am Superintending Engineer, Indus Left Bank Dirision, acting for Mr. Dunn, who is absent.
- 2. Q How long have you been connected with these works?—I have served as Executive Engineer, Sind, 43 years and as Engineer and Secretary, Indus River Commission, for 9 months.
- S. Q. I suppose there is no question of famine relief works?—I think not. Last year there was a threatened scarcity caused by people coming in from Cutch.
  - 4. Q. You never consider it necessary to keep up a programme of relief works?—Such is never called for. We only open so-called famine works to meet the requirements of people coming in from Kutch.

- Mr. Dawson. 5. Q. The point that concern us in the Irrigation Commission is to enquire how the irrigation system can be 5 Nov 1901 improved so and to the various food supplies required for the country. We should like your opinion on this?

  — My information is based on the replies given to the written questions already asked. To begin with, what strikes me is the very large area of land that is cultivable but is not cultivated or assessed, 700 square miles I suppose you understand we have in Siad a system of fallows. you understand we have in Siad a system of fallows.
  - 6. Q. Will you explain this system P.—We are supposed to allow for three years' fallow and one year's caltivation. The area commanded is therefore four times at least the nrea that will be cultivated nnunally. In some ground crops are grown year after year, but ordinarily there is three years fallow, and the revenue settlement provides for only that, calculating one-third of the area as assess-
  - . 7. Q. You deliberately provide for only irrigating each year 3 of the area ?-Yos, the land won't stand irrigation every year.
  - 8.  $\hat{Q}$ . If ad you occasion to go into that ?—No, we have statistics but our projects provide for irrigating only  $\frac{1}{2}$ .
  - 9. Q. As the result of your ebservations, doce it appear a reasonable thing to reserve such a large amount of fallow?

    —Yes, in the present condition of the people.
  - 10 Q. I sappose there is no restriction. They may enlivate the whole area P—Yes. Land is assessed as lift or flow, but a man is not allowed to convert lift late flow without permission.
  - 11. Q. Can you tell me approximately the relative nrea of kharif and tabi?—I can't give it to you otherwise than in n blue book.
  - 12. Q I suppose the "lift" is rabi. You give in statement "C" the total area cultivated. I suppose the wheat crop represents the rabi P-Not altogether. We have a large area of Jhamba and other oil seeds.
  - 13. Q. As far as water is concerned, putting aside lands under fallow, I suppose there is plenty of water for increasing the sabi caltivation ?—No, not in our causis.
  - 14 Q. In the river?—Yes, there is ample water. We have measured 34,000 cubic feet a second. That would inhave measured 31,000 cubic tects second. That would increase as the river rises, but it is on too low a level to be utilized in estals. We are exercising the beds of some of the canals to give a supply at what is called the fair irrigating level. We speak of 13 feet on Bukkur as being a fair working level and it corresponds to 17 feet at Kotri. It would not pay us to deepen some canals became they would become silted early in the season. Certain of our canals are vory good rabi ones.
  - 15. Q. You mean it would not pay at the present assessment rates ?—It would probably disturb our system altogether to irrusate specially for rabi.
  - 16. Q. What is, roughly speaking, the bed slope of canals?—Usually 5" to 1' per mile,—sometimes vil, the surface slope is then given by the rise of river.
  - . 17. Q What is the slope of the country?—Near the river itself it is running inland sloping 9 inches to a foot and thea reduces to 4 inches per mile.
    - 18. Q. Sloping away from the river ?-Yes.
  - 19. Q. I find in one of the papers the remark that "well irrigation need hardly be noticed—27,000 acres P"—Yes, the statement is given, but I think the Revenue Department had better explain how it is classified. I think it is due to our cannis, by the water level being raised, but it has hone classified as wells and not under cannis. it has been classified as wells and not under canals.
    - 20. Q. But still the wells are very largely used P-Yes.
  - 21. Q. What abant is the depth of spring level?—Perhaps a little back from the river face we should find water in a few feet. It follows the ground level.
  - 22. Q. What is about the outside the cultivators have to raise water?—Ordinarily ten to twelve feet. But in Hydenabad our canals get very little flow, the irrigation is all lift and the wells are deeper, down to 50 feet I think. Outside the onnal tracts they have deep wells up to 90
  - 23. Q. Even where they are only 10 feet below the surface would cultivators prefer canal water :— I really don't know. I think they would if they got flow. We have certain restrictions on the description of cultivation to be grown. We might not allow them to grow rice on such lands.

- 24. Q. Then there is a restriction on rice?—Yes. Owing to the larger quantity of water it requires.
- 25. Q. Do the oultivators apply to the Collector for pormission to grow rice?—Yes, to the Assistant Collector, who passes it un to the Engineer concerned.
- 26. Q. Is the silt which comes into your canals fertilizing of sorts ?—I think not appreciably. If it puts merely a skin on the ground the people undoubtedly praise it, but I find if eilt is brought by flood it eften gives trouble.
- 27. Q. Have you both large and small inundation canals ? Yes.
- 28. Q. Are the small ones private property?—No. Practically all the causals in Sind are in Government charge. There are a few private ones and they are gradually being
- 29. Q. Are those in Government charge under the Irrigation Department?—Yes.
  - 30. Q. You are responsible for clearance !- Yes.
- 31. Q. What are about the maximum and minimam levels on the Bukknr and Kotri gauges?—We mark every year on a diagram the average of ten years. This diagram shows the heights. It starts in the month of January. Our present average height is about 5' on Bukkur.
- 32. Q. That is the minimum ?-No. Two feet below
- 33. Q. What is the average P-About zero.
- 33. Q. What is the average ?—About zero.

  34. Q. What does it rise to ?—Starting at zoro it just touches the foot and then on to 1½ in February, thea to 4. At the end of Maroh, and at the beginning of April it rises to 5′. At the end of May it reaches 6′9. We get a temporary rise in the middle of May. This year it went to an enormous height. At Dena Ghazi Khan it reached a maximum record. From the 1st June it rises to 11½ at the end of June. Even on the 10th July it reaches 12½ and it stands at that height until the end of August. The faul height it may reach varies from about 12′ to 17.9′. The minimum I have not here.

  35. Q. Thun there are varietions of at least 6 th have not
- 35. Q. Then there are variations of at least 6 ft. between the maximum in one year and the maximum of another? We generally approach 13.
- 36. Q. Then it might be as low as 12 and it might be as high as 16 ?-Yes.
- 37. Q. You are ongaged on the Indus Survey?—Yes, We are doing what we can.
- 38. Q. Do you go further up than your own province?
- 39. Q. Would not that be necessary ?-No. If we think there has been crosion of the liver fuce we survey the river for a few miles above and below and leave on record possibilities of future movements. We are also measuring discharges.
- 40. Q. And taking cross sections?-Yes, depths, cross sections and velocity measurements.
- 41. Q. In your answer to question 5 " aroas of irrigation, etc.," you give a table. It gives altogether the areas commanded 44,000 acres, besides which I gather there are 150,000 acres which may possibly be irrigated by proposed canals P-Yes.
- 42. Q These are extensions which might be made to the canale?—Yes.
- 43. Q. Do you think that you will add nearly I million acres?—Yes.
- 44. Q. This million acres, what is it going to cost? How many laking of rupees?—Possibly 45 lakins or 50. I have not got estimated figures. I am not familiar with these figures because I have only had charge of the Division for a short time.
- 45. Q. Then you say 10 lakbs of irrigation for 50 lakhs. of ropees 9-Yes, I think that would be a fair estimate.
- of ropees?—1es, I think that would be a lar estimate.

  46. Q. According to the present system, in may year you would irrigate a third or fourth of that?—I believe that is right. I am not sure of the figures. It may only be a third that we expect taget out of that.

  47. Q. Have you had experience of land that seems to be injured by salt or red?—I have bad experience of it. I prefer not to mentica any opinion on the subject. At Karachi wogst rice, but a poor description requiring a large amount of water. amount of water.
- 18. Q. To come back to private canals, are they the property of single individuals or communities P-I think of single individuals.

- 49. Q. I understand there is a very large area here under jagir?-Yes.
- 50. Q. Are these the men who make private canals?
- 51. Q. As regards making new canals would you make any difference where it is jagir land?—Yes, because we only get a hakabo rate. It may be 8 oo aas an acre.
  - 52. Q. Would you avoid such lands?-Yes.
- 68 Q. On the other hand, I suppose many of the jogir-dois get capals by toknyi? Yes, I think so.
- 51. Q. It is a boon giving them free water?-Yes, that is what it comes to.
- 55. Q. Is there any irrigation in Sind dono from mountain torrents in the west?-Very little; they bind up suall streams.
- 5d. Q. You are in favour of construsting a weir at Bukkur! Yes, but more information is required before I can come to a final decision. Until I came to answer cortain questions put by Mr Higham we had nothing at all prepared regarding this scheme.
- 57. Q. You estimate the cost of 100 lakhs?—Yes, that includes interest.
- 58. Q. Have you say real doubt on the subject as to where the site of the weir should be. Must it be above Sukkur :—Yis; there is no other point where it could be except at thermek. That project was examined very enceful; with a vi w to taking an irrigation canal to Karachi, bot ufter examination, it was considered that it would yield
- 59. Q. When you say no sites what do you mean ?—No suitable foundations.
- 60. Q. Do you think there is practically no site elsewhere !-- No.
- 61. Q. (Mr. Higham)—The statement you have given us shows about ten thousand square miles in Sind that are irrigable but at present not provided for by irrigation?—I have not got that staloment. I have not seen it.
- 62. Q Have you any idea whot the area is that remaios to be taken np?—No. I have no idea.
- 63. Q. The cultientle area is 13 million acres of which you irrigate 23 million acres u year !—Yes.
- 64. Q. Aro you supposed to Irrigate one-third of the area commanded ?—Yes, we are, however, doing very much more than that on some canals.

  65. Q. On a broad average you Irrigate that ?—Yes, that is what it practically omounts to.
- 66, Q. Of 7½ million seres commonded you irrigate 2½ million seres, that leves obout 5 millions Yes, but I don't know what the 6 million seres mean. It may Include all sorts of land.
- 67. Q. Whot would be the result of constructing o weir and raising the level of supply to the canals on the right and left bank and giving a perenuial sopply? What additional area would it enable you to bring under cultivation. What would it pot on the right bank i—I estimate that oa the average we might expect murty 4 lakks of rupers.
- 69. Q. I am talking about areas; whot would be the iditious area of cultivation?—Aboat 120,000 occus on the right bank.
- 69. Q. That would be new enlivation !- Altogether new cultivation on lands which don't get water now except on rare ocessions of flood.
- 70. Q. Multiply that by 3, the actual portion under commend, that is, 300,000 acres, and you would improve the conditions of supply to the existing cultivation?—It would render the existing outlivation permanent and secure.
- 71. Q Wint additional area would you take up on the left bank?—I don't know what the figure is, but Mr. Joyner sais 300,000 acres practically would be brought under cultivation.
- 72 Q. The greater part of the left bank is in foreign territory f-Yes, Bahawalpar and Hyderatad.
- 73 Q. Would the land in Bahawalpur be under com-mand !-It will be practically "flow" instead of "lift."
- 74. Q. I think on the left bank of the river the present irrigation is chiefly "lift?"—Yes.
- 75 Q. If you make the weir it would be flow ?- Yes.
- 76. Q. What is the difference in the rates of flow and lift irrigation !-I think the rate would run Rs. 2-1-0 for

- lift and Rs. 3 for flow, bot a smoller quantity of water Mr. Dimena.
- 77. Q. Would it only cost 12 annas to lift the water? 5 Nov. 1901. Mr. Joyner estimates it would cost 12 times that.
- 78. Q. If you give flow irrigation although the reconna-would not increase much the cultivator would benefit?—
- 79. Q. (Mr. Higham.)—Is there not a large area in the Hyderobad tabel not irrigited at all ?—Yes.
- 60. Q (The President.)—There is plenty of room for extension of irrigation in Sind !—Yes.
- 81. Q. If the weir is made at all you will take full value out of it ?-I think so.
- S2. Q. (Mr. Higham).—Is there any reason to suppose that the withdrawal of supplies from the Ponjah will injuriously affect the sapply in the Indaa canals ?—In my opinion none at present, because of the cold weather discharges. All that we require us for the Nara and the Pholleli and those which have cold weather irrigation. I don't think it can have any effect. The Punjah canals only take 20,000 with fact. cubic feet.
- S3. Q. What is the minimum discharge of the river?-Last year we measured 35,000 cases. The measurements we have only had for the last two years and the duschargu does not necessarily vary with the gougo.
- 81 Q. That 35,000 was measured at Kotri and the same at Sukkur?—Yes, nothing goes off between.
- E5. Q. That is exclosive of what is passing down the Nari, how much does that take ?—Probably not more than 2,000 n occord at this season of the year.
  - 86, Q. It is immaterial ?-Yes.
- 87. Q. If we take another 10,000 onsecs off in the Paciab would not that effect this discharge ?-It might affect our supply slightly.
- SS. Q. When do you open?-Between the midulo ond end of Mny.
- 89. Q. What would your supply rise to in May?—I have shown we get 100,000 per second with a gauge of 0' on Bokkur. A withdrawal of 5,000 cusecs would not have any effect at all.
- 90. Q. Then the proposal for a weir is not with the object of preventing the retrogression of the Sind canals owing to the withdrawal of water in the Punjab !—No, the weir is regoired to ensure command and extend cultivation in Sind.
  At present it we wish to make extensions we must deepen
  the 'take off' of our canols.
- 91. Q. With your weir you will get an increase in the corface slope?—Yes.
- 92. Q. And therefore a less deposit of silt?-Yes, in the Nari not in the canal.
- 93. Q. That would only extend a short distance because you get on notural levels again. So from consideration of this subject you think you chould build a canal at Sakkor for a crose of ropees P—Yes, if it is practicable
- 94. Q. What woold be the advantages of it. It is un-necessary, I understand, to prevent the present canals falling back?—No, it would canvert the Sukkay and Ghay into percental canals. We would then know moves for efficient cultivation. We might have a large tract on the left bank at Hyderabad. The combined revenue from these improve-ments would unquestionably give us a return of mora than \$\frac{\psi\_{\text{total}} \text{ result} \tex 6 to 8 per cent. on expital rost.
- 95. Q. Assuming tha cost would be a crore?—Yes. Then we would be owed all the trouble and accessity far surveys at the months of the Ghar and Sukkur which limit the orea on account of the ancertainty of the oupply, and we would also provide for extensions a great deal more than is praidle at present. Opening up the Hyderabad area would be an enormous improvement.
- 96. Q. The supply would be much more constant!Yes, it would be permanent in a sense.
- D7. Q. That would lead to an increase of assessment !-Yes, finally.
- 98. Q. In the meanwhile the average sapply would be brought up to the level of the maximum. —I think so unquestionably. The real difficulty is construction, which involves measure work with compressed air at a depth of 40 fee, and provision of slokes.

Mr. Dawson. 99. Q. Might you not divert the river from one side to the other?—I think not. That is my present impression. 5 Nov. 1901. It would be a magnificant work if it could be earried out.

- 100. Q. Are none of the canals supplied with distributories?—Yes, they have branches.
- 101. Q. What is the length, provided P-I could not newer. We have long distributories. Down in Korachi thoy have very small distributaries.
  - 102. Q. The water courses belong to the villoges ?-Yes.
- 103. Q. What length; how many miles !—I oan't give you the figures. I have not leoked at them for years.
- 104. Q. (Mr. Hibetsen).—Do your canals ever fail in drought?—We have sesseities.
- 105. Q. Within your experience to what would that scaroity amount, what propartian would the contracted cultivation hear to the area of oreps ordinarily matured?—It might be 1 in bod years.
- 106. Q. That is a maximum?-Yes, and that would be only on specially bad canals that had something wrong with their mouths.
- 107. Q. Is very much damage done by water-logg-ig?—There has been, but practically none since the eming?-There has been, hankments wore made.
- 108. Q. Have not drainage works been excented?-We have spent a prere of rapees on the Jameno. On that systom they have a drainago system as part of the project.
- 109. Q. Do you think that drainage is required?-I think so in certain tructs.
- 110. Q. Has compensation ever been given within your experience for the damage dons !- Never.
- 111. Q. Don't you think it would he right to give compensation when you injure a small truet for the benefit of an
  immense anmber?—I think it is the fault of the cultivator
  taking too much water in order to give full benefit of the silt for rice enliration.
  - 112. Q. What form does the injury take ?-Marsbes, etc.
- 118. Q Does tho health of the people suffer seriously ?-Fever is a result.
- 114. Q. Are the remissions considerable?—In some
- 115. Q. What proportion of revenue is given?-Wo have flood remissions and remissions for shortage of water. The latter is given on the examination of the reveaue official and a villago punch; so much by the aggregate outturn on the area concerned.
- 116. Q. If you get a four-anna crop, you would not charge half rate?—No.
- 117. Q. The assessment is made by the village punch?-
- 118. Q. You have nothing to say to that? Do you think that the remissions are liberal?—Yes, very liberal.
- 119. Q. What credit, direct or indirect, is made to your anals?—The whole revenue realised on the area of irrigated land, after deducting, I think, o per cent. for collection.
- 120. Q. The assessment is levied only on land sewn, is it not?—Yes, but it is compulsory to cultivate each field periodically. A man has to pay his assessment if he does not.
- 121. Q. How far are the Sind canals provincialised ?-They are all Imperial.
- 122. Q. Does the Provincial Government get no share at all of the Revenue ?—I think none.
- 123. Q. Do you experience any difficulty in getting money to extend canals?—There was some difficulty a few

- yoars ago, but lately we have been treated very well. At present there is a difficulty in getting finds for works classed uader 43 instead of 49.
- 124. Q That is extensions and improvements to existing
- 124. Q That is extensions and improvements to existing canals and extending ethers?—Yes, we have such projects as the Hasanali. We may be able to epare measer for 49, we have a difficulty to get it for 45.

  125. Q. We are told that you have some tea thousand square males of land anirrigable but irrigated. Your statement shows that \$\frac{3}{2}\$ of the cultivable land is irrigated and that \$\frac{1}{2}\$ is lying fallow. You told us also that you have schemes which would add materially to the area irrigated, and that large extensions are possible?—Yes.
- 126. Q. During the past 13 years there has been next to no increase in cultivation and next to no increase in irrigation. (Witness produced statement to explain.)
- 127. Q. Within the last 11 years have there been any large extensions?—Not very mach. We have constructed a large number of works, which have, however, not yet begun to show results. The next few years ought to show a considerable increase. We have also secured stability of irrigation; the annual area fluctuates much less than fermerly.
- 128. Q. Suppose you had unlimited money could you extend irrigating practically to an unlimited extent.—No, to an unlimited extent. We should have to bring in labour from outside.
  - 129. Q. You are doing that?-Yes.
- 130. Q. Yon say that a good many of the existing oanals were made originally by the people, and that the private casals have been gradually absorbed. Has the process gene on in your own experience ?- Yes, we have cases.
- 131. Q. Why has it been necessary to absorb them ?— Owing to the neglect of the owners who had become bonkrupt the lands fell out of cultivation and the people themselves appealed to Government to take the canols over.
- 132 Q. Has the oristence of private rights in ennals impeded progress on Government canals?—Yes. But not appreciably.
- 133. Q. In a tract where Government is not prepared to extend irrigation within the next 20 years, would it not be a good thing to stimulate the construction of private canuls?—We have very few tracts in which to give out rights for private canuls, There is little room for them.
- 131. Q. Has there been any treuble on priento canals in the recovery of dnes?-1 den't know.
- 135. Q. Do you charge any royalty on private canals for the water ?—I don't know. They are mostly ou jagir
- 136. Q. Do you know what the owners of the private earnly take from enlituators as water-rate?—No. I think it is a charo of the crep.
- 137. Q. Have you may experience of the working of the statute labour system ?— I have had a few such canals in my change, and it is thought unsatisfactory. Some men do not do their share.
- 138. Q. If the men don't finish their share of work it has been necessary to take it over ?—Yes.
- 139. Q. Is it not the onse in Sind that canal water is only used to start the rabl which is neatured by the wells?—I den't think that is the case here although it may be to some slight extent on porticulor tracts.
- 140. Q. Have you any knowledge of tracts which are irrigated from wells without cannt water—that are independent of wells?-No.

WITNESS 2 .- MB. T. SULLERS, Superintending Engineer, Indus Right Bank Division.

Mr Summers. 5 Nov. 01.

- 1. Q. (The President.)—I understand you are seting as Superinteoding Engioeer f.—Yes, of the Right Baak.
- 2. Q. The part you know hest is the left bank ?-Yes.
- 3. Q. We wish to ask you about the left hank. How many years bave you besa in Siad ?—Ten yeare.
- 4. Q. What is your opinion about the extension of rahi irrigation? Do you think it should be encouraged?—Yos, decidedly.
- 5. Q. Woold you do it by converting the present inundation causes into personnal caoals?—Yes, as far as possible.
- 6. Q. We were told just now by Mr. Dawson that if we increase the number of peronnial cannis there will be tremendeus increase in the amount of silt? De you share that opinion?—These large pereanial canals don't silt, they seem out, at any rate this is the ease with the Fulcii ceaal.
- 7. Q. 1 gather from what Mr. Dawson says, at all times in the year there is a silt donesin f—There was in the last five miles only of the Fulcit; before the escape was opened in 1899, new there is none. It scenrs ent above?
- 8. Q. What is your greatest slope ?-33 inches a mile is the bed slope of the Fulcli.

Mr. Summers.

- 9. Q. Have you experienced any other canal excepting the Fuldi ?- Same of the large branches of the Fuldi with discharges up to 1,600 casees dun't silt at all.
- 10. Q. I surpress where silt does exist, it is near the canal heads?—Yes, of the branches. They all silt except some large ones, which don't oilt at all except at their tails, when there are no escapes.
- 11. Q. And is this silt clear mon a costly business ?— Yes, about a lakh and a quarter for the Enlelt: it used to be 14 lakhs: it is greatly reduced.
- 12. Q. I suppose clearance of silt is all doos by minual
- 13 Q I indeestand the Puleli Canal was an inendation canal oad son made it into a percential canal. Was there any difficulty with the cultivators?—No. They took to it at once. They get flow in the cold season in the lower reaches. The result of making the Fuleli percential, at a cost of only 2 lakes of rapees, has been to provide a cold-washer supply of about 1,200 cubic feet per see, which will certually bring in an extra revenue of several lakes.
- 11. Q. And you command the countre well ?—Ves. In the lower portion of the Fulch for about 40 miles, the land is 'ow, b it in the upper half the land is high.
- 15 Q. Is there are passibility that a weir bullt at Sukkur woold affect it?—If no extra 4,000 is taken off it would affect the depth of the Indus by about 9 inches to a foot, If it is running 50,000 cubic feet per second.
- 16. Q. How far is the head of the Fulch below Sukkur? I could not eas. (This was accounted from the map and put at 300 miles.)
- 17. Q. Have you had any occasion to question this ration of having three years fallow to one years erop? system of harl No, not at all.
- 19. (Q. Mr. Ibbetson.)—Do you think that lurning the exacts into percautal counts will do not with the accessity of follow?—No.
- 20. Q You do it agree with Mr. Pallicer that if the rabi is increased it will be at the expense of the nutumn eron ?-No.
- 21. Q Are you getting near your limit?-No, about 4th of the cultivable area is onlivered.
- . 22 Q. The increase of irrigation on the Fulcil le 80,000 · 22 Q. The increase of irrigation on the Fulcil le \$0,000 acres in the ten peurs ending 1900-1001. Is that increase due to a reduction of fallow area?—It is principally awing to the duty of water being increased from about 49 to between 50 and 60 acres per enbio faut per second of discharge by putting a stop to waste and distributing the water by rotation. Most of the outtration on the Fulcil is rice.
- 23. Q. Are further extensions possible?—Witness explained his project for the new lineasin Ali Canal, for a second escape nu.] for farther improving the irrization of the Fulci Cival. He said that encouragement of bear traffic was very important. The cost of camel can large to the people in the Budin taluka used to be I lakh n year. Now that the grain and rice is carried by boats it is only 1115,030
- 21. Q. How much moury has been spent on the Fulcli?— Live than a lakh a year—gerhaps 5 lakbs allogether during the last ten years.
- 25. Q. And by how many acres did the irrigation in-erere i-siy 80,003.
- 26. Q. That comes in 6 enpers on acro? -- Yes, and with little more expenditure. We have not got to the limit of distribution. We woul distributory chancols?
- 27. Q. How far do you irriga's from your canal by pairate nator-courses ?- Therois a private one 40 miles long. 23. Q. How lar do the villages take the water from
- the canni ?-Perhaps 3 or 4 miles 23. Q. Yan would alter that by making distributory cl. nucl. ?-Yes, and masonry outlets.
- 30 Q. Does any part of your work take you into the villages 2-Not much. We are fully engaged in carrying works, distributing unter, and stopping works and have little time to think about crops.
- 31. Q. Do you do the rotations?-Yes, it is all done by
- 32. Q. Does the system work well du you think ?- Yes.
- 34. Q. There is no clashing of nuthority between the canal officer and the revenue officer i-Not in rotation;

- they help in that. It is only in waste of water that I have had any clashing. The fines not less small.
- 31. Q. Is there much still on your estimates to he spent on the Fuld! ?—The Hearn Ali Wah is a sanctioned project and the second escape is mother one, which will cost 4 lokes of rupees.
- 35. Q. Suppasing a weir coold be built to suit the Fuleli and other caush, du you consider it a desirable thing to have it? I dua't think it would pay.
- 36. Q. You don't see any argent need of it?-No, because if we improve the canal system we have now we can irrigate all we want. (Described on map.)
- 37. Q. I think you hard the questions I put to Mr. Dawson. Did mything occur to you on which you would be inclined to express a different opinion?—Na, except that the Fulcil escape is really a drainage causi. The whole of this country need to be absolutely water-logged and the people used to take their cattle away to the high lands. Those 'dhunds' (depressions) are non furned into the finest cultivation.
- 83. Q. What caoses do you think have kept back irriga-tional progress in Sind?—Perhaps too much work for the engineers to do.
  - 39 Q Insufficient atnff ?- Tes.
- 40. Q. Have you had any experiences of private cannis?

  -Yes. There is one of the largest private canals in India from toe Fulcii.
- 41 Q Ifon does it work ? Vary well-I believe. The owner irrigates more than he is allowed by his caned.
- 42. Q. Yan refer to a private canal from the Fulcli ?-
- 43 Q. Does the owner use the white water himself or does he give the water to others?—Does he sell water to others? Ho uses nost of the water fur his own hand. Inst within a week or two before leaving the district I locked lato his sanad and found he was taking more, weter than he was allowed.
- 41. Q. It is a jugir ?-Yes, a single owner.
- 45. Q. Have you ony other experiences of private anals? There are several smeller mass
- 46. Q .- Of private owners P-Yee.
- 47. Q. Would you etimulote the making of private usls?—I don't think it would work. Private canals are often given up.
- 49. Q. hey don't us n rule arrigate successfully P-No.
- 49. Q. Still admitting full that, in a truct where Gor-ernment is not prepared to extend irrigation would it not be a good thought to have those private causes?—Yes; they do more good than barm.
  - 50. Q. You would encourage them ?-Yes.
- 51. Q There is scope for that ?-Yee, a little scope.
- 52. Q (Mr. Higham) Has your experience been confined to the Faleli Canni ?- Entirely.
- 53. Q. Nat on coy other ?-No.
- 64 Q. How many yearn?-Ten years.
- 55. Q. Is the Pololi entirely different from the others in respect of the surface slope?—It's average ourface slope is 43 inches a mile.
- 56. Q. It's bed slope is only 33 inches a mile?-Yes.
- 57. Q (The President.)—What is the disclarge?— 10,000 enhis feet per second is the maximum discherge, 7,000 the average.
- 58. Q. (Mr. Higham.) What ore the improvements made in the Fukli. ( treeribed an map. )
- 59. Q. 14 the burden on the cultirators in clearing their rater-courses very considerable?—No, I don't think no.
- 60 Q. Clearing the silt from the water-cour-es?-No, I think it is quite easy for them. They do it in a for weeks.
- Oi. Q. Are there not further improvements proposed ?— Constructing distributuries will cost many lakis of rupees. There are thousands of water-courses, all with hacheha mau(h4,
- 62. Q. Have you olways been able to get hold of money you wanted for improving? How much do you spend a year?—Nearly & lakb a year.
- C3. Q. Do you mean on new works ?-Yes.
- 61. Q. Half a lakh a year for improvements f-Yes that is about the arcsoge.

Mr Summers. 5 Nov. 01.

- 65. Q. You know nothing about private canals taking off from the river ?—Very little,
- 66. Q If private awners are allowed to take causla away without restriction are they not likely to interfere with the Government canale?—They will come in the way of our new canals.
- 67. Q. Is there not danger from that ?—There might. If we make this new Hasausli Canal very few, if any will come in the way.
  - 68. Q Da they often make new canals ?- Hardly over.
- 69. Q. (Mr. Rajaratna Mdlr.)—You just taild us that owing to certain improvements made on aertain canals a private owner has benefited very largely. When were those improvements carried out P—Some years ago one of them and the private owner will benefit still further, later on.
- 70. Q. To what extent has be benefited? Can you give a rough idea?—He gete a batter supply because the water level is raised in the Fulcli.
- 71. Q. In the increase of area of enlitivation or bow has he heacfited ?. Has the area increased ?-Yes, the area or cultivation has increased.

- 72. Q. Is the canal officer responsible for messenting the area ?—The Revenue Department anly.
- 73. Q. Was the fact brought to the Revenue authorities notice that he has benefited by it? How data the Ravenne Department know ?—As far as I recollect, I wrate to them about the oultivation. It is an important question. If he is going beyond his sanad, he should pay a large assess-
- 74. Q. You referred to some wanting of water. How is it wasted !—Flanding jungle or wasta had.
- 75. Q. What is their abject in doing that?—They may get little patches of grass to grow or it may he simply carelessaess. For inetance, can of the Municipal Commissionere told me that they had to carry the water-courses neross low ground and had to bank them np. Cattle walked across them and knocked them down and flooded the fields, for which he said, they shalld not be held responsible, and, similarly they have been accustomed to wasting much water.
- 76. Q. (The President.)—Is there any particular fine for this ?—No, but I think they should pay the fall rates of assessment for unauthorized cultivation in suob cases.

#### WITNESS No 3.—Me. F. Sr. G. Genbie, Executive Engineer, Jameso Canal.

Mr. Gebbie.

1

- 1. Q (The President.)—I undarstand, Mr Gobbie, you re Executive Engineer of the Jamrao Canal?—Yes, 5 Nov. 01. northern section.
  - 2. Q. That is on the right bank?-Na; left bank.
  - 3. Q. Tho Jemrao is the newest project you have ?—Yes, it has any heen campleted two years.
  - 4. Q. You were there from the first? Practically from
    - 5. Q. Is it perennial? Yes.
    - 6. Q. It is a branch of the Eastern Nara river ?-Yee.
    - 7. Q. And has it a masonry head ?-Yes.
  - 8. Q. What volume of water does it supply ?-About 3,000 cubic feat per second.
  - 9. Q. What Is your longitudinal slope !- From the head to the fall it is 1 in 5,000 and after that 61 inobes per mile.
  - 10. Q. Do you find the silt clearance a serious difficulty? -No, we have bad no trouble.
  - 11. Q. Is the Jamrao an entirely new canal?-Eatiroly
  - 12. Q. How did the country do before; was there no cultivation?—There was a little cultivation.
  - 13. Q. The offcot of this Jamrao Caual has been to bring a large area under oultivation which abould go on increasing f-Yes, up to a certain limit.
  - 14. Q. Woold you explain to ue the system of coloniza-tion an this canal?—Only a few villages on the Dim Minor have been colonized. In these there are about 1,600 Pan-jabis, chiefly from Jullundur and Gurdaepur. At first many

of these men were very discantented and wished to return to the Panjab to try and get laud on the Jhslum Canal; but the excellent results of the past kharif season have altered their views. The rest of tha laud in the northern altered their views. The rest of the land in the northern district is cultivated by the original owners, who have some difficulty in getting sufficient labour; but this is gradually coming in from Cutch, Marwar, and Guzerat.

- 15. Q. Havo you much difficulty in getting money for these projects?—I don't think there was much for the
- 16. Q. Do you knaw anything about 75,000 acres to he brought under the Ghar Canal !—No.
- 17. Q. Who has been working it np?-Two Executive Engineers, Mr. Wright and Mr. Karpur.
- 18. Q. Did you get out any proposals with regard to the improvement?—There were no proposals made except to europly the Ghar from the Sakkur. The natural levels are, against it.
- 19. Q. Do you know what the supply is in the Eastern Nara. It varies with the inundation. It is about 21,000 online feet per second at the top of the inundation. At presout it will be 8,000.
- 20 Q. And is it all the water they want?—That is all the water they want in the Jamrac.
- 21. Q. Ara there any further extensiane ?-In the
- 22. Q. Could they utilize more water on the Eastern . Nora than they get at present !- I don't know.
- 23. Q. Is the rabi copply there too low?—Not on the Januarao. The Eastern Nara is in flow all the year round.

#### WITNESS No. 4.-MR. R. J. KENT, Executive Engineer, Public Works Department.

Mr R. J. Kent. 5 Nov. 01.

- 1 Q. (The President.)—You are Executive Engineer, Wosten Nam ?—Yes.
- 2. Q. How lang have you held that aliarga ? ZSix months, 3. Q. From where doss the Western Nara obtain its sapply?—It takes off from the right bank of the Indus about five miles from the large town of Larkana.
- 4. Q. In it a permanent canal?—It was originally an old branch af the Indus, hat is naw an inundation canal.
- 5. Q. Has it got eluioes and a head regulatar ?—It has no hoad regulator, but there are many eluices across it, in the lawer reaches, for regulating the supply.
- 6. Q. Is it an executive division by itself P-Yes, since the year 1890.
- 7. Q. I supposs the executive work upon it is chiefly clearance of silt?—Yes.
- S. Q. Have any impravements been carried out recently?

  —Yes, during the past twelve years many large improvements have been carried out, including the anastraction of two new feeders to the main cause from the river and several targe branch causis.

- 9. Q. It is one of the old-fashiooed inundation caosls?
- 10. Q. In the cilt olearance expensive?—In the main canal although the hed slope is only about 3" par mile still the amaunt of cilt deposited is very small, and for many years post no expenditurn has been incurred in clearing it. The reason for not silting must be attributed to the excelleat draw-off by the large number of branch canala.
- 11. Q. Have you any proposals for improving the canal?

  —Yas. It has been praposed that a new casal should be taken out from the river for the purposs of relieving the Nara of the greater part of its irrigation in the last 40 miles. This canal would bring a large area under cammend which is too high to receive flow water from the Nara and which canally he intended in cool water by life and at the cool water than the state of the cool water than the cool water th which ean anly he irrigated in good years by lift under tha present systam.
- 12. Q. When does the Western Nera cease to flow?— This depends on the condition of the mouth. This year it ceased to flaw at the end of November.
- 18. Q Would there be any advantage in deepening the channel l-1 think pote

- 14. Q. Would it be any advantage to the people to have rati water ?—It might be, but on the whole the recept near to be fairly contented no they are. Years ago the area round the Mancher lake was the finest wheat-growing tract in Sindb.
- 16. Q. Why bus it follen off?—Before the river bunds were made the Indus flood used to pour large volumes of water into the Muncher and the surrounding country. On the fall of the river this was drained off egain into the river by o natural escape which exists to the south of the district. The large area so drained was sour with wheat and other rabi cross The object of the river bunds was to prevent destruction to canals and to enable the cultivatura to grow

Lharif crops which hitherto had been impossible owing to the flood water aweoping all before it.

16. Q. If we had a weir unde at Sukur the Western Karn would link jule it?—It might, end it would then be 5 Nov. 01. u perennial canal.

- 17. Q. (Mr. Highom.)—Are there any distributaries on this canul?—Yes, there are a great number.
- 18. Q. Are they all Government channels ?- Yes.
- 19. Q. Do you want uny more of them ?-Yes, several new distributaries are being investigated.
- 20. Q. What fall have they got P-Falls varying from 3" to 6" per mile.

#### Witness 5 .- Mg. P. J. Connart, Executivo Engineer, Public Works Deportment.

- 1. Q. (The President.)-You ore Executive Engineer of the Begari Canols?-Yes.
- 2. Q. Have you been long in that position? I went up lust April. I was there twice before for shurt periods. I know something about the country.
- 3. Q. This is a group of canals?—Yee, there are three main ones.—The Bogari, the Unherwah, and the Desert Canal.
  - 4. Q. Are they all immdation canals ?- Yes.
- 5. Q. Arn they fur obove Sukkur ?—About 34 miles in a straight huo-60 miles by river.
- 6. Q. How much is the irrigation in that system ?—On the Begari 285,000 neres, on the Unherwah 20,000 acres, on the Desert Canal 130,000 acres.
- 7. Q. Of the total enturable area, you estimate that one-third is ununully irrigated ?—Yes. The Deputy Commissioner considers that on the Begari Canal, we should ullow for half the culturable area being annually irrigated.
- S. Q. As a matter of fact you blink that in land, oachalf lies fallow?—I chould not say that generally. It depends on whether the cultivators cau get sufficient woter, and lubour.
- 9. Q. Is a great extension of cultivation possible P—Yes. The potential area of irrigable land in Baluchistan is about 500 square miles. (Explained from the mup.)
- 10. Q. Have you gone into the reason for illowing the large muonnt of follow?—The reason is supposed to be that land won't stand cultivation more than one year in three. Another reason is that there is not sufficient labour and monute.
- 11. Q Toe Baluchia are not cultivators?—Practically not so far as canal cultivation is concerned.
- 12. Qt The population is scanty ?-Very. Do you get labour from the Paujub. It which y comes from Afghonisian.
- 13. Q. You are too far up to be offerted by the question of a weir at Sukkur?—Yes. The only effect the weir would have in my district would be to make the course of the river more stable by reducing slightly its bydranlic gradient.
- 14. Q. Have you much trouble with silt?—There is A good deal of trouble in old bronches. There is no silt in the first 47 miles of the Begari Canal. The Desert Canal is being remodelled. The surface velocity at its head is six feet per second. The Begari Canal has also a large velocity.
- 15. Q. How far loss the remodelling of the Desert Canol got?—We have completed the remodelling up to the 3th male. The work will be completed this year with the exception of a new canni, the Adiuwab, which is included in the project.
- 16. Q. How for has the remodelling of the Begari got?—
  We have empleted the Contour Survey for the last 46 miles
  of the Canal. Two large new bronches have been surveyed
  und leveled, and the main could and all its bronches have
  been surveyed and levelled. One of the branches 503 miles
  long, runs into Khelut territury.
- 17. Q. You have no estimate or data to lay before Government?—A project called the shikarpar Caunl has been completed. The Begari Canal Remodelling is on ulternative to it. The idea is to find out which in the better scheme. Everything is purely tentative. The Begari Remodelling scheme is not being done on its merits, batto find out what it is worth. I am opposed in the large branch canal into Ktelat territory.

- 13. Q. Have you knowledge of the other canals ?—The Mr. Corb.tt. Began discharges 7,000, the Desert Canal about 5,000, and the Unherwah 2,000 ensess. Two new branches from the 5 Nov. 01. Desert Coool are being made in Balnehistan.
- 19. Q. Then you will have command of a very large areo of waste load in Baluchistan and British territory from the Devert Canal P-Yes. Large orem luve been given nut ta Biluchi Zemindors. Last sonson some land was given out to a Marri Zemindar.
- 20. Q. Where do Biluchl Zemindars get their lubour from f-Chiefly from Sind. They are not importing more labour now because they get all the Sindhi labour they wunted when the Desert Canal was first made.
- 21. Q. (Mr. Ibbetson.)—Now remodelling in being done there must be more lobour. Where will the Bilachi Zemindars got people to de their increased cultivation f—From Sind and possibly the Panjah.
- 22. Q. (The President.)—Is there a dense population in Baluchiston on your cannin?—Yes, probably is dense.
- 23. Q. Where do you make your head-quarters?—Daring the bot weether I am supposed to be on the Kushmur Bund. This is the first year that the Executive Engineer has been ullowed to go to Subkur.
- 21. Q (Mr. Highum.)—Where is the Kashmer Bund?—
  (Described from the map.)
- 25 Q. Whot have you been doing on the Desert Gaual?—Its remodelling has been under construction for the past three years.
- 26. Q. What is the estimate P-About 13 lakha including the Adinwala.
- 27. Q. On whot lines are you remodelling f—Widening and regrading the existing canol and branches and nonstructing new branches. In Khelat we are moking two new branches to replace seven old kurius. I am new proposing distributaries from the branches so os to save the cost of constructing pucks kuriu sinices, and lo enable me to control and regulata the water-supply.
- 23. Q. How is the count working where remedelled?— Exremely well. The people got moke (flow) water where formerly they only get checki (lift), and they got a plentifull supply.
- 29. Q. The result of that would be that you irrigate the greater portion of the area commanded?—They started doing so, but locusts and grassboppers came and are up the young shoots twice.
- 80. Q. You are giving out new land ?- Yes.
- 31. Q. Will the new land be occupied ?—Yes, all the loud the Deputy Commissioner could give out was given out.
- 32 Q. Do they give the land free of assessment P-No, bot practically free from malikann or occupancy fee.
- 33. Q. On the Begari you have a scheme of remodelling What new land will be taken up?—It is proposed to add portions of the Ghar, and Enkkur Canal ayatems to the Begari. It is cleo proposed to extend the caltivotion in Balurhistan. Woste Isad commanded by the Pryari, but for which water is not available, has not been yet given out.
- 34 Q. Is it possible to command much land in Rhelat?— Tes, if the remidelling proposals are carried out. The potential area of irrigation from my district is about 500 square miles.
- 55. Q. You only get a maintenance rote from Khelat?— The Balachis pay us one rapeo per core. They have agreed in pay Rs. 1-S per acre for all land berigated by the Desert Canal after it is remedelled.

Alr. Corbett.

36. Q. That rapes an aero goes to cover the cost of maintenance?—I don't know how it was arrived of. The onnal is a political one constructed to tempt the Balachi tribes to settle down. It has been successful in that object.

37. Q. Whot do you estimate the rate of maintenance per acre P -- About six annas.

38, Q. You don't moke much profit from irrigation in Khelat ?—No.

39, Q. When you go into Khelat territory how is the management dono ?—There is no menagement. The people irrigate the lond and the tehsilder sends an annual statemont showing the area cultivated.

40. Q. You have no particulars ?-No.

41. Q. If we put a weir at Sokkur, it will not affect your ounds ?-No.

42. Q. I suppose it would have this effect Tho Sukkur Canal would be taken up from the weir and you coold send more water on into Khelat? - I don't follow that. I don't think it would command the load up thero.

43. Q. Is not the river altered very much ?-Very much.

(Explains from the map.)

41. Q (Mr. Rajaratna Mdlr.)—You say new lands ready for irrigotion one given from of water-rate?—No: free nf malikana or occupancy fee. On the Begari, I believe they charge Rs. 2-8 0 in places.

45. Q. The whole assessment is remitted for some years?
No, assessment is charged overy year. No malikana or occupancy fee is charged.

46. Q. (Mr. Ibbetson.)—On entering into occupation of the loud this (occupancy fee) is remitted P—Yes.

47. Q. (Mr Rajaratna Mdlr.)—And not woter-rato?—
Thero is a consulidated assonament for land and water. The
irrigation department is oredited with 78ths of the consolidated
assessment. No remission of the consolidated
assessment is given unless in easo of the failure of crops.

#### SIXTH DAY.

#### Sukkur, 6th November 1901.

#### WITNESS No. O .- Mr. E PINNEY, Executive Engineer, Karachi Canal.

Mr. E. Pinkey. 1. Q. (The President.) - I naderstand you ore in executive charge of the Korachi Canol?-Yes.

2. Q. How long hove you held this charge?—I have only held charge since April last, but was in the come district for about ten months in 1897. 6 Nov. 01.

3. Q. How lang have you been in Sind?-Since early in 1803.

4. Q What is the tutol area of irrigation?—About 70,000 acres on the Punjari and about 203,000 for the whale district.

5. Q. Aro your canals all inundation canals? - Yes.

6. Q Are any of them need for growing rabi crops in Yes, the Pinyari flows and the Bhagar flows a little in the cold weather; the rabi irrigation is all by dift. a little in the

7. Q. Is there much seepe for an increase of irrigation on lands which have not yet been tnoched by cauch? Howe you any projects for extensions?—There are one or two for improving the canals.

S. Q Is there any wish among the people to have rati irrigation? would it pay to deepen the causle so as to make them per unial?—I should not think so. The irrigation from lift is so small at present os compared with the total.

9. Q. It might be extended if they chose to extend lifts?

—At present lift irrigation it so small; it would never be very big; there is no inclination to irrigate from the lift, judging from my experience of what they do in Sind.

10. Q. Is that because of want of energy on the port of the people or is it because it does not pay them?—Partly because of both. In the Western Nori district the land that was formerly irrigated has been deserted in parts and the men have gone to the tail of the eanal where they can get

11. Q. Is the difference between the rates for lift and flow irrigation great ?—Not very g.cat I believe.

12 Q. Have you any private enacls in your district?—None that I know of .

18. (Mr. Higham.)—You were speaking about oultiva-tors leaving lift irrigation, and descring the upper reaches to go to the tails of the canals in order to get flow?—I said that with reference to what is left on the Western Narl

14. Q. Is not that due to the fact that the cost of the lift is sa much greater, owing to the small difference between the lift and the flow rates !—It may be, but I think it is due to its being easier to get cultivation on flow and it pays better.

15. Q. If they could get flow they naturally would Pbeliere.

16. Q. Have you much land under command now that was formerly nnoecupied?-Very much (refers to map and explains.)

17. Q. Everything you have water for is fully occupied? I have no sorplus water, but I could irrigate 30,000 acres more by moking improvements.

18. Q. Where is this 30,000 acres?-(Exploined on mop)

19. Q. Is the rainfall in the Karachi district more than that further north?—I think not. It is very uncertain. In 1897 there was about 13 inches, and in the last three reasons we have not had a couple of inches in each year.

20. Q. Is the enant irrigation supplemented by wells; do they require wells?- No.

21. Q. Can they moture the rabi erop without wells? - I don't know. There are wells, but they also use water standing in the big enoals that has not dried up.

22. Q. They lift it !- Yes.

23. Q. To mature rabi crop they must lift, water either from canals or wells?—Yes.

On subsequent enquiry I find there are some private ennals .- E. P., 8-1-62.

#### WITNESS No. 7 .- MR. R. GILES, Commissioner in Sind.

Mr. Giles.

1. Q. (The President.)—I ondorstand, Mr. Giles, you have been owny years in Sind?—Yes. I have been here 6 Nov. 01, oloso on 33 years.

2. Q. And know the whole pravince from end to end?—I have been in every taloka and know somethlog of every part of the province.

3. Q. (The President.)--We are not concerned here with anostimes of fan ine relief, but it is our duty to enquire how far Sind can subscribe towards the food supply of the contry and whot improvements and extensions can be made in irrigotion. What we wish first to osk you is to exploio some points io the tables, which were sent to na which we find it difficult to understand. Whot chiefly strikes us is the lorge area (said at one place to be 10,000 sq. miles) not assessed and not cultivated?—It is described not quite correctly. I think or irrigable.

4. Q (The President.)—The figures are given in the footnote to stotement "G." Mr. Muir Mackenzie rold it was estimated that 10,000 eq. miles of irrigable loud were still left in the province ?—I have game very closely into the question and undoubtedly the word "irrigable" is wrong and shoold be 'cultivation

whether by irrigation or rain water, wells, etc. I would prefer referring to the statement which follows G among the Rerence Stotistics; with regard to every tulnka I have some knowledge and therefore I can shew you by turning to one taluke only that the word cannot mean "irrigable as it includes land irrigable by rain, land which the Tapadar (who Is the lowest Rerence official) has clossed as culturable. He deem't know whether the Indus water can be brought to it or not; the real proper expression for soch land is "fit for caltivation."

- 5. Q. What do you think, with the amount of knowledge we now have, would be a safe estimate of the orea in Signary when I was discussing it with Mr. Dawson yesfeedoy he said perhaps a good estimate would be a fourth of the 10,000 asy, miles, i.e., of the 63,00,000 acres, but I think a larger area. Mr. Dawson said that his was a very rough estimate. My opinion is that the orea is distinctly inrec. It is quite clear that the GI lakks was a mistake. Take for instance Karachi, where the oulturable area is shown as 51 000 seres. If anything is set led it is that Karachi will not be irrigated by the Indus. That question has been thoroughly threshed out in former years by the Engineers.
- 6. Q. By "Karachi" you meaa Karachi district?-No, the taluka
- 7. Q. There is no canal irrigation in the taluka?—None. I have a report from the Deputy Collector of the Shahhandar Dirlsion lu which he says an area opproaching two lokks is irrigable in that Division alone, hat yesterday I discussed this with Mr. Dawson and Mr. Snumers who was the Executive Engineer of the (anal Division from nhiel the water would be supplied and they were of opinion that probably 60,000 would be irrigable from the Indus.
- 8. Q. In your opinion Mr. Dawson's rough estimate of 16 lakhs as the irrigable area is low?—Yes, I think there is a large area which could still be irrigated. Mr. Dawson has not a very intimate knowledge of the province, After a short service in it he went back to the Presidency and has nolly just returned. He was formerly in charge of the Karachi Division but does not know the prevince
- 9. Q. In your statement "A" there is 1,270,000 neres shown as 'alienated;' that means jagir ?—Yes.
- 10. Q. It is a very large proportion of the province?—With regard to the lagir had it has always seemed to me a pity that canals should not from the first be credited with full revenue. The whole canal revenue cought to be credited to the canals and areas which have been granted for political reasons should be a debit to their proper department.
- all reasons should be o devit to their proper department.

  11. Q. Until you have a perennial supply of course the rabi irrigation will be uncertain; but do you think it would be an improvement to try the perennial or pakka system of load-works purely from a khorj' point of view?—The ordinary cands in Sind have no cold weather supply and you can never toll what the Indus may do at their wouths. Head-works in themselves are no protection as the river may leave them high and dry or crode them ac-ording as it wanders from one side to another. Until you have permanent heads you can have no certainty even as regards your kharif crops and, as a rale, no regular rabi supply.
- 12. Q. A weir here would not do any good to the Begari Canal?—No. The Begari owing to its situation has worked better—it has had less had years and suffered less than most of the canals.
- 18. Q. Do you happen to know if the Engineers have got a project for improving the irrigation of the tract of country at the tails of the Begari, Salkur, and Ghar Cano's?—Yes. There are two alternative project, etc., to increase the width of the Begari Canal, or excavate a new one to be called the Shikarpar Canol. I have written very strongly obout it and I ndvised Government to send up an Engineer. It is very disappointing; the people have suffered for years from an unreliable and insufficient supply.
- 14 Q. All the available money has been spent on the James and Right Bank works?—Yes.
- Jaminso ond high hank works ?—1es.

  15. Q. There has been no large increase of irrigation (according to the statement) in the last 10 years?—That is quite true; we have had a good many bad years. 1897 and 1898 were very good years; 1803 and 1898 were very good years; 1803 and 1898 very bad gears. We have had unnsuelly had years complet with this drought, otherwise our area would have good up very much. Then again the effect of the Jaminso is not included. In the first

year the cenal irricaled only 11,000 acres, in the third year there were over 175,000 acres under cultivation and 4 lakts of revenue. These last figures correspond to the project estimate for the asseath year. The ordinary estimate in Sind is that hand is cultivated eace in three years. The best meas in Sind are collisated every year, but the circumstances vary coormandy. I essid mane a whole taluka where the land is high (under lift) and is only oultivated once in four years that in the north of the Hyderahid district, where there is a large number of wells will good irrigation every field is cultivaled every year. There is a vest difference hotween different parts of Sind. In some places you have only to bring water to hore the land irrigated every year.

16 Q Is there well irrigation independent of canals?—

- only to bring water to hore the land irrigated every year,

  10 Q. Is there well irrigation independent of evanls!—
  Practically none. With regard to sistement "I;" "the area
  under wells," what is put down there as well outlivation unduabledly gets its shief sapple from the evanls. Owing to
  the rise is the level of the water canced by the canals, I
  suggested that this should be altered and the area credited
  to the canals. Sir Evans James took of different view and
  therefore we left things as they were.
- 17. Q. In there any feeling here that what is grown by to well is better than that grown by the canal?—Certainly.
- tho well is better than that grown by the canal F—Certainly.

  18. Q. What do you put that down to ?—The man who has a well will ordinavity be more careful. He has to be industrious to build his well. The cultivotor practicelly resides in the fields. The outtarn would be better than the outtarn of a field under ordinary flow irregation. If I were a zemindar myself there is nothing I should like better than to have a good tract of land irrigated by wells. I am always advising the zemindars to build wells.
- 19. Q. It is much more expension for them? The flow ratea are extraordinarily low?—That is a very hig subject indeed. I hove just recummended to Government that the rates for flow ou the Militane Canal should be raised a little. rates for now ou the Miltr. o Canal should be raised a little. Now that there is perennial irrigation there I don't think the lift rates too high compared with the flow rates; tha lift produces a better crop. Under native rule the lift paid more because the outturn was greater.
- 20. Q. Nothing is credited to the man for his own cost of lifting?—Wo don't charge on wello at all. We trent wells as non-sxistent as regards assessment.
- 21. Q. The last column of the statements of cultiration on wells shows assessment of Rs. 54,000 P.—The rule is this. We assess land which is irrigated by wells exactly as if the stell was not there. If it gets a flow supply we assess it at flow rates. If it gets a lift supply we assess at lift rates. We ignore the well altogether. For instance, supposing the rabi crop was irrigated with canal water at the end of the flood senson and received additional water from the well, we should ussess the field as if irrigated by the canal only. the canol only.
- 22. Q. Would you geremlly advocate the deepening of causis for rabi irrigation ?—That is too much of an engineering question for me. It strikes ms that the causis might
- 23. Q. You are agreed that there is a very large area still irrigable and cultivable in the province and there is lots of water in the Indus?—Yes.
- lots of water in the Indus ?—1es.

  24. Q. Supposing you had monoy to carry out works would there be a difficulty obout finding cultivate a?—Yes, at first, bot they would be forthcoming in time. The Balachts on our frontier are hading for land. Hajputane would also send as men. There is always a want of cultivators at first, When I want to the Janumo last year, there were very few people to cut the crops, but that was practically the first year. You must allow time.
- 25. Q. You say money is given more liberally for canals by Government now thou it used to be ?—Yes.
- 26. Q. What is your opinion about private canals?—
  There are private canals all through the prevince. By
  assuming the entire management of the canals we have spoilt the people for the construction of new private canals.
- 27. Q. Are the private canols properly looked after ?-Not always.
- 23. Q. Are they the private property of individuals or exammanities?—Commanities governily.
- 23. Q. Are people anxious for Government to take them neer?—They like keeping them until there is a dispute. We go on taking over causls. We have just take nover three important causls in one taluks.
- 30. Q With your experience of Sind do you know of places now water-logged which used to be flourishing?-

- Mr. Giles. The best example of this is uniforbiedly the Milhran whem water was given too profusely and a great deal of the land 6 Nov. 01. has become sadden and block from salt.
  - 31. Q. Has this last efflorescence done much harm?—It would be difficult to say, as there are always other areas available; but as cultivation and population increase in a taluka likethis (Sutkur) with villages all about the salt ballow threather with sufficient and the salt ballow threather with sufficient salt about the salt lauls are brought under enliration.
  - 32. Q. What is the population per square mile?—There are about 47,000 square miles and 3,200,000 of people excluding Khairpur. Large areas of Sind are hill and desert. Roughly speaking, half of Siml is culturable.
  - 33. Q. Is the advance of irrigation here, as for nre aware, hindered by want of ostablishment ?- I think so.
  - 3i. Q. (Mr. Hibetson.)—I understand, Mr. Giles, that in Sind as the India supply never fails, water is pleatiful and therefore famine is unknown?—Yes, except in the desert. The moment famine occars there the people all come in execut a certain number, obiefly high casts Responts and a few others, and the consequence is that actual famine relief work is very little indeed. It is not conducted on Famine Code principles. principles.
  - 35 Q. Of course you have good and bad years. What do you suppose as compared with an ordinary year, the difference in the whole yield animants to in the worst year you have knowledge of?—1895-98 was a very had year; 1897-98 a good nme. The difference in cultivation was 700,000 acres. The remissions represent only about 75th of the total less to the country.
  - 36. Q. At any rate though no famine is possible yet a So. Q. At any rate though no famine is possible set a bad year involves an enormous loss of yield to the people which presumably might be remedied by solvenes for making more cretain the supply?—Yes, certainly. It will never be remediable to a large extent except by a system where a permanent supply can be given. There is no permanency in the Sand Canala except the Sulkur Canal and where you have a green supply. have a sure supply.
  - 37. Q. Then your system of assessment is a consuli-duted charge on the assessed aren?—Yes, subject to remis-sions on poor crops assessed by the Tehnildar or Mukhtiarkar assisted by assessors.
  - 3S. Q. Supposing that in a surrey number the total area of which is 6 acres three was an acre of entireation and four acres remained uncultivated, how would you occuss the anapher?—We should take the arse-smeat on the entire area of the number.
  - 39. Q. Supposing the number was entirely usenhivated how would you assess it?—We should take no assessment sabject to the limination that after the number had remained four years in succession uncultivated, it would be assessed in the fifth year, whether cultivated or not.
  - 40. Q The assessment on the number in which there was entired in would be subject to remission for poor crops?—Yes, even on the uncultivated number of second in fifth year remission would be given if from any reason soch as failure of water-supply, cultivation was impossible.
  - 41. Q. What is your scale of remusions?-If the gross rolluce exceeds twice the assessment no remission is given, If it does not, we take one-third of the produce.
  - 42. Q. What proportion of the revenue is credited to canals?—90 per cent.
  - 43 Q. Is that a direct or indirect credit f-It is a book credit.
  - 41. Q. Do you know what share the Lucal Government takes:—I don't know.
  - 45. Q. You tell us that private canals have been gradually absorbed ?-Yes, there is still a certain number of private oanals,
  - 46. Q. Now in nn ares where Government is not p 40. Q. Now in an area where coverament is not pre-pared to undertake works for the supply of water, would it not be a good thing to stimulate the construction of private canals?—I don't think so. The people would not make them. They are all looking to us.
  - 47. Q. You think nothing we could do would, stimulate tle construction of private canals ?- No.
  - 43. Q. Do we take a royalty for the use of river water?
  - 49. Q. Have you any power to anthonise a conal being enried over the land of another man?—No. Neither do

- we generally help them .- Yes, the Bombay Irrigation Act provides for such authority, but it is very seldon used in
  - 60. Q. You don't think this is an abstacle ?- No.
- 51. Q. According to the Bunhay Rule no revenue is taken for private improvements. How do you reconcile this with taking more than one-tenth of the manal revenue in laud irrigated by private encals?—Most of our private canals take out of Garcenment canals. Private canals from the river are almost unknown.
- 52. Q. My points this do you think a liberal reduction should be given on account of outerprise in making or improving private canals. Bu you think it would be a stimulus ?— I would not reconnected that for a moment.
- 63. Q. (Mr. Higham.)—There is a small reduction I ree?—Yes, that is for clearance.
- 54. Q. (Mr. Ibbetson.)—I understand you to think that taking Sind as a whole two-thirds fallow is not an excresive estimate?—I think that would be about correct.
- 55. Q. Do you think that this large follow area is due to want of labour! Yes, I think so.
- 50. Q. As the population increases you may expect to see that diminish !- Certainly.
- 67. Q. Mr. Pelliser accme to think that a perennial supply would not reduce the fullow Irrigation ?- I do not
- 58. Q You say wells are very volumble to supplement the canal irrigation in the rabif Yes, in certain areas.
- 69. Q. I understand that well lerigation is charged by. Q. I understand that were tregation is energed at the ontes which they would pay for the usualble canal irrigation if they took it f-Generally so; if the land would ordinarily be irrigated by lift then the kharif lift rate (the lowest rate of assessment) would be taken, and if by flow, then the flow rate.
- 60. Q. Is not that assessing private improvements?—
  If we were to assess it according to the lift rath rate we should put on a couple of rupes at least. If you look at our table of rates you will ree that this is the case.
- 61. Q. Practically then the well does get loner rates ?-
- 62. Q. I see from statement E that in 1896-97 there acres 4,699 wolls, in 1897-98 2,000 and in 1898-90 5,699, What does that mean f.—The number of wells depends on the goodness or otherwise of the inundation.
- 63. Q. Does it mean the number of wells netually worked !- Yes,
- 61 Q. At any rate we have the fact that you have never reached a maximum of 6,000 wells in Sind?—No.
  This statement E is a statement of cultivation by wells only you ought to add the number of wells nited by canals—9,328. Take 1899-1900, 5,617 wells; in addition to that in that year there were 8,328 aided by canals, altogether
- 65. Q. In the mreas in which wells can be constructed moderately and can be worked at a proof is there much room for extension?—Yes.
- 63. Q. What could we do to slimulate that extension?—
  If you could do away with all the present complicated rules regarding tokari and allow us to give takevi on simple
- Gr. Q. What are the main points you would sorgest?—
  I must refer to the present rules. When the Makhtiarkar has drawn a cheque it has in come back to the fluzur Deputy Collector for an endorsement of an order of payment. I should like to see one document which should form the application and the bond. That document should he given to the zemindar who should present it to the Mukhtiarkor for codrasement as to the amount of land to be held in security. I don't think it is necessary to go thereoghly into whether the takur is much needed or not. Some certificate is necessary. That heing satisfactory the applicant takes his money.
- 68. Q. How long do you postpone the first recovery full depends. There are two systems of talant grants under two different Acts. Under the Lond Improvement Act, the two different Acts. Under the Long ampravement act, the postponement is ordinarily fixed with reference in the time when it is estimated that the improvement will begin to yield a return. Under the Agriculturists Loans Act, the postponement of the first payment is usually for 12 months.

- 69. Q. What is ordinarily the period of recovery?—Up to 20 years in grants made nuder the Land Improvement
  - 70. Q. Is that ordinarily given ?-No.
- 71. Q. Why?—I don't think the Revenue officers are always as lenient as possible and in Sied few (if any) large works rendering long period advisable ore carried out by private individuals.
- 72. Q. What is the ordinary period allowed for the epsyment of, may, 300 rapees ?— From five to six years.
- 73. Q. Would not longthening that period premate upplications for taken's—I don't think so. With regard to taken's I am anxious to make onother improvement. We used to give monoy for canal clearance under the Agricultarist Lans Act no being an urdinary recurring expenditure, but Government now insists on its being granted under the Land Improvement Act.
- 73. Q. Is the latter system more complicated?—Yes, money for ordinary clearance operations should not be treated us Public Works. Must of our money under the Land Improvement Act is given for canal clearance and very little for wells. I think it would be u very great advantage if we suild go back and grant the former under the simple restern. the simpler system.
- 75. Q. Do you think having to pay 61 per cent-makes much difference?—No.
  - 76. Q. What security do you take ?- Land, chiefly.
- 77. Q. The laud to be irrigoted by the well?—I was not thinking of the wells—the man'e holding.
- 78. Q. Do you require collateral security?-Not gene-
- 70. Q. Do you insist upon registration?-That is according to the umount.
- 83. Q. Has a mon to go to a registering officer to register the security?—No.
- S1. Q. Do you lead on the joint security of a village?
  -No-there is no village system.
- 82. Q. Supposing soveral land-owners came and wanted to horrow on their joint security, would you lend them?— Yes, I have got all the people to sign together but of course it has given an immense uncount of trooble, but by that means I have got o consi cleared which they would not have done independently.
  - 83. Q. There is no combination among them ?-No.
- 84. Q. Has a land-owner any difficulty in sinking well. Is be likely to come neross difficult strate?—Yes.
- 55. Q. Should not help be given—boring tools, expert axistonee or advice?—I don't think so. They have their own skilled mon for wells.
- 86. Q! (.Ur. Rajaratus Ildlr.)—Are remissions only ranted in years of drought?—Remissions are granted wheo he erop fails for any cause for which the nutrivator is not
- 87. Q. Evert year it is grauted? It is to be expected every year?—No It is not expected, out of u whole taluka you will not get a single application.
- 83. Q. Do you great remission for a 2-anns or a 4-anns crop?—If the value of the crop is less than double the assessment remission is giren.
- 89. Q. You have no sart of classification ?-No.
- 93. Q. The vaine is double the usessment 2-Yes. Then Government takes one share and the zemindar takes the other two shares.
- 91. Q. Is the remission limited to a tract ur to individual fields?—The individual field.
- 92. Q Even though the onresunding fields may have less f-Yes. They would then be entitled to remission also. It used not to be so. The Remission Fules are obsolutely the result of long experience.
- 23, Q. In stutement E mention to unde of "wells independent of earnly? —They are said to be so; I say they are not.
- 94 Q. I suppose all these well lands are commanded by the canal—they might get a cauch supply ?—I should say a very large aamber cuald.
- 95. Q. If eveal water is used for one month and well water for the remaining peried, do non charge?—We charge the ordinory rate. We generally charge the lift Larif

- 96. Q. What would be charged if a field got assistance from a supply which belonged to Gorernment?—We should charge according to the description of supply received, i.e., a more notes such supply was soperior as, for instance, rabi lift from a canal.
- 97. Q. Are these well lands ussessed independent of the canal P.—In these cases where they are independent of the canal we still examine to see what the consl supply might
- 93. Q. Have you one information os to the number of walls constructed during the last ten years with the aid of loans?—No. There bave been very few. The people making will don't care for loans. They are generally careful men and I don't think they eare to borrow.
- 89. Q. You said if the precedure as regards takers advances was simplified nod loans promptly granted there would be more applications P-Yes. I am trying to simplify the procedure and have called for reports from all Collectors. Before the applicants get the money into their honds there is great delay.
- 100. Q. Why fout people toke the leans?—In the matter of taken's we are going ulong at a tremendous rate, os Relurn I (Recenne Statistics) will show, but the nacertainty as to grants forms a hierance. Thus in the financial year 1897-98 Government was noahle to give uny grant to Sied.
- 101. Q. Would the appointment of a special officer for disbursing loans promoto extension?—That is a question like many others that I have been thinking shoat. I think it might, but the worst of it is that he would be wanted everywhere, and often oil that is necessary is a very little enquiry. One proposal has been put forward, which affects taken; is a one artisin fixed days, the mukhtiorkor should he in the kachori for the disposal of all personal opplications or complaints, the fast being widely known. The tokavi would than be given without only references to subordinates. The proposal is olredy known os "kachari" days, and there is no doubt that it would be an udrantageous one. Sending a chaque to the Hazur Deputy Collector is simply ladicrous; it doesn't make things one atom sofor.
- 102. Q (Mr. Higham.)—Turning again to this question of fullows. I understand that when an estimate for a canal is mude it is customary to take \{ of the area that will be brought under command as the area to be irrigated annually ?—I think that is generally done. I abould say that was the rule. I don't think though there is u rigid rule to that effect.
- 103. C. Looking at the figures you have given to as, it oppears there are about 7½ millions acres on the canalo and 2½ millions arrigated only. In it considered necessary that there should be a fallow two years out of three to save the land from exhaustico ?—That depends upoo the water-supply and the owners of lond you are decling with.
- 104. Q. If you have very good land and plenty of water there is no reesan why you should not irrigate the same land every year?—Yes. There are large areas in Bind enlivated annually. Ordinarily rice is cultivated every year.
- 105. Q. In some ports they give rice laud o fallaw ?-
- 106. Q. Is there room for increasing the irrigation in Sind, out by going into new tracts but by earrying on improvements on the existing causis?—Yes, to a rery considerable extent.
- note extent.

  107. Q. The & rule would not apply?—You would not get an exactly proportionate roturn by remodelling—say you double the orea of supply I don't think you would double the cultivation.
- 108. Q. My point is this. To increase the total area in Find it is not necessary to take up new lands or new tarritory?—No, there is a good deal to be done on existing roads; the remodelling, apart from oxtensions, will lead to larger irrigation of the urea commanded.
- to larger irrigation of the urea commanded.

  169. Q. One of our witnesses coid the people were very right in some evest to ubandon lift irrigation if they got flow lower dawn. Have you known any cases of that sort?—I can give you an instance of ubandoning lift for flow in tha lands odjoining the Jomrao, e.g., the Taudo Allohyúr Tolula the cultivation of which is all under lift and the cultivators of which have been with dilieutly kept from transferring their tenancy to the zemindars on the Jamrao.

  110. Q. The difference between the rates of lift and flow appears to be very slight?—Yes, I am not our priced at your saying that.

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- 111. Q. What is the difference?—Here is a teluka with o lift rate of R2-12 and flow 3-8. In Sukkur, which is a very good taluka, the rates are, flow 4-4, lift 3-9. Rico is more of course. The difference varies. If we had the population the lift would be the hest because it does not render the soil water-logged, has better straw for cattle, and the people live in a happier way in their villoges in the tolukas where there is lift irrigation. Every Revenue officer will soy that lift is hotter.
- 112. Q. Havo you any idee whet the cost of lift may be taken of P-The subject of the cost of lift has been deals taken of 1—The subject of the cost of lift has been dealt with at great length by different officers and is one regarding which I could submit stotistics, but not give any definite figures off hand.
- 113. Q. I want to know whether you can explain on what considerations the lift rates depend?—The lift is a very sure supply. It never fails and never varies. They don't have troubles as regords flooding.
- 114. Q. You don't think it would be an advantage, as far ne the people me concerned, to convert lift irrigation into flow. You think they me better off as they ore P—Yes, I think so, but orops are raised with so much less trouble and labour under flow that limitation to lift would mean a great reduction in the food-supply. Moreover, it is only following on economic law that people should go where they can raise the largest area of every with the least labour, e.g., when the ground only needs to be scratched and the water to be torned on.
- 116. Q. When the Rohri Canal was thrown out by the Irrigation Committee of 1892 were you on that?—No.
- 116. Q. One of the erguments in invour of the project was that it would give flow irrigation ?—Yee.
- 117. Q. I think all the new projects substituted for it will not give flow?—It is rather a difficult thing to say for they are supposed to give a very considerable flow supply. I om very much inclined to doubt if they will give as much os is onticipated. I know lift areas where people connot be got to take up the land, e.g., the Tondo Allahyar
- 118. Q. Anything to do with the rates?—Nothing at all. It would not he wise to say one prefers lift to flow. Either is very geod-for the production of grain in the
- 119. Q. If a weir were made at Snkkur it would reopea the question of the Robri Canol?—Certainly. If the
  woir was possible, abent which I know nothing, it would be
  magnificent in its results. In the first place the whole of
  the Khairpur State could be irrigated, then you come down
  to the Hydernhad District with its high lift lands which
  would nli be irrigated by flow. The Dad and the Nasrat
  Canols would be abandoned of course os independent
- 120. Q. The statements we have bed regarding the weir deel mostly with the right bonk. As regards the effect on the left hank we have not had any opinious?—You con get the whole motter from Mr. Joyner's report.
- 121. Q. Is colonisation now proceeding on the Jam-rao ?—I am just going out to see about it. None is pro-ceeding at this moment.
- 122. Q. Why?—Because there have heen difficulties about the supply, and the Colonisation Officer Mr. Robertson wrote in and said he thought we had better not go on with the colonisation until the success of the canal was more cure,

because if these colonists saw ony deficiency they are apt to pack their goods and go home. The first 8 miles has silted a good deal, but it goesthrough a very hod hit of sandy country. But that in the opinion of the Engineers was to be expected and will gradually right itself. Then where we can we will begin colonisation again.

- 123. Q. You are now marking time ?-Yes.
- 124. Q. How many colonists have you?-26 yeomeo,
- 116 pensents.

  125. Q. The irrigation that has been recorded has been mostly by the existing people?—Yes. To the local people we have given large areas of land.
- 126. Q. The coleaists all came from the Punjob !- Yos.
- 127. Q. Has the question of rates on jagir lends over been discassed f—The question of bakelo bes been discussed as to what the rate should be, and it has been definitely fixed, for Kelat at 1-8 per acre.
- 128. Q. Is there any other case except that of Kelot? Yes, on Jagir lands in Sind irrigated by Government canals the rate on which varies from 10 annas to 5 annas per sere according as the enlitivation is 'rice,' 'flow' or 'lift.'
- 120. One rupes is what a zemindar generally takes as hakabo when he clears a canal.
- 130. Q. And he takes a share besides?—No, he takes nothing more for cost of clearance.
- 131. Q. There are some private channels on the Fuleli?
- 132. Q. If Government made the distributary cheunels, water would be economised?—Yes, but it should be remembered that the esuels had for the most part existed prior to Government toking possession of them, and that they had a vast net-work of private obannels, i.e., distributories from them which it would take un immense sum to re-moke or remodel, and merely to build the sluices on their months means lakes of rupees.
- 183. Q. In many places the water-courses run parallel to each other, so thet each mon may have his own channel; that leeds to waste of water Yes, but the people object to heing charchelders and insist on their right to separate chounels. But in the Hyderahad District, where the old Inundation Cenals are very hed and the clearances are heavy, the people would glodly here their channels cleared by Government. A very curious thing which I may meation as regards the irrigation in Sind is, that under the Irrigation Act the Shiness are the property of Government which the people used to be made to make. Even now we try to got them to pay part, usually half of the cost. Properly speaking, the onus is ou Government. The pelicy, however, is to leave things to work on os they best een on all existing coals.
- 134. Q. What do the sluices cost?—Anything from 200 to 1,000 rapess. If you put oil these sluices in direct charge of the Arrigation subordinotos, it would mean an enormous increese of establishment. It seems better to enormous increese of establishment. At stock watch the new system on the Jamino and see how it works watch the new system on the Jamino and see how it works when canals are end then on that experience improve. When canals remodelled all the sluices are provided by Government.
- 135. O. From whot I have heard the colonists are not 13D. Q. From whot I have neard the colonists are not yeary satisfied. Why are they only brought from the Punjah?—That is the effect of the Chenah. Oor colonist officer went to the Chenah and studied the work there and so sought his colonists from the Punjah.

Note.—The seventh and eighth days sittings were held in the Punjsh, and the ninth to thirteenth days in Rajputana and Kathiawar.

#### FOURTEENTH DAY.

#### Ahmadabad, 2nd December 1901.

WITNESS No. 8 .- Mr. BAHMANJI EDALJI Modi, Deputy Collector, Kaira.

Answers to Printed questions.

Paragraph 1.—The totol area of the Kaira district is 1,021,372 ocres and the total culturable area is 893,307 Mr. E. B. Modi.

3 Dec, 01. The area protected by Gorcrament irrigation works is 8,893 ocres in one taluka—Moter—where the land is irrigated by flow from the Kharl River. About 698 ocres can be wetered from the Kheri River in Mohmadabad taluka by lift.

The area protected by villego werks, namely, tanks, is 20.952 nereo.

The area protected by wells in 47,268 acres.

The roil of the greatest portion of the distict is allorial, while in the western part of Matar trluka the soil is black learny, where rice and wheat are grown. There are also large tracts of had in some of the rillages of knyadrani and Thara talukas called the Mol; the soil carsisting of black soil or white allorial soil, is about two feet deep resting upon a concetionory had of Ilmestona. These bind lands generally lie uncultivated.

If the rainfall is plentifed no artificial irrigation is

Extent to which culture required for the crops sown in the raing teason; even the soporiroz kinds of rice which tipen about the beginning of November can do without irriga-

When the roins full in the beginning people raise seed-lings of rice and havts (Eleusine coracavano) in prepared bads by well-irrigation, so that they may be planted not at the proper time. When the rains foil in the latter part of the reason, rice is watered from tanks and wells, and in the villages commanded by the Khori from the water taken by fow from it.

The rainfoll for the whole district is on an average 26

Rainfall.

Rothes In some years two maximum unwares much us 60 inches
and the minimum 16 icelies. In 1809, the year of drought,
there was not more than 4 or 6 inches of rain.

There is no demand for water in a year of ordinary
Dimand for water daring roinfoll during the south-west
south-west moneous.

Tice which ripen after the cod of the moosoon do require

The crops which require irrigotion are rica and tobacco.

Crops regality irrigation.

In some challeng irrigation.

In some places tobacco is not irrigated, but the superior kinds require two or three waterings nifer the end of the season. In some places tobacco is not irrigated, but a larga portion is inligated about eight times during the season after the close of the rains. The yield of enthicated tobacco is generally double that of the unfringeded. The water of certain localities is specially suited to tobacco. Barley or jon is irrigated generally with brackish water mbod S or 10 times during the season. Wheat is also irrigated if the soil is entable, about four or five times during the cason, and the yield is then three or sometimes four times that of the unirrigated wheat.

Justi is grown by injustical.

Just is grown by irrigation during the summer chiefly for the sake of the fodder.

Sugorcane requires watering every ten days.

The other irrigated crops are the garden crops of outons, chillies, ginger, garlie, cumin, carrots, radishes, egg-plant, edibla hibiscus.

Except in the Khari irrigation tract there is no control over the invigation. Feeple can draw water by lift from the rivers, and have, eince the introduction of the Revised Survey in 1895, nothing to pay; they can also take water from the tanks, bot have to pay the water-unes occording to fixed scales when their lands have no water-rate charged shready on them. Those who have wells in their own fields have not to pay anything; when they toke water from wells in Gorcrament waste lands, they have to pay a water-rate of Rs. 8 per law for the sauson.

\*\*Preserved 5.\*\* Perspirated invitation weeks.\*\* Those

Paragroph 5.—Provincial irrigation works.—There is only one irrigation work which may be called the Provincial Irrigation work, namely, the Khari Irrigation. The Revenue is credited to Imperial Land Revenue. These laro been no new works. This is on old work. The Khari is a small river und tha water from it is taken by flow by 12 villages by turn, namely:—

	,
1. Kawra. 2. Kajipuru. 7. Pinglaj. 4. Pansoli. 5. Dhadhal.	7. Bherai. 8. Govindapura (Inami) 9. Necka. 10. Novagam. 11. Kathwade.
6. Malarpura.	12 Chanidra.

The river is divided into two branches of Pinglaj, the villages of Pinglaj, Pansoh, Dhadhel, Malarpura, Bherai, Gerindapura, and Nacka taking water from the east branch by turn, while Navagam, Kathirada, and Chandra teke the water from the west branch.

Formerly there used to be earthen hands pot up in order to raise the level of the water, but subsequently mooden claims gutes were put up.

Before 1876 there were no works for regulating the flow of water into the two branches, and the result was that for many years the western branch carried much more than half the water, and the villages on the east branch used to enfer greatly, and in 1878 it was found necessary to give remissions of water-rales in the castern villages.

The Chief Engineer, Irrigation, examined the locality and derised a plan by which the flow could be regulated. It was decided to throw half the water into the eastern and half into the western branch. Other improvements were

No new Provincial work has been sanctioned.

There was a project for making the canel from the Mashra River, and after a good deal of enquiry it was faulty obandoud in 1893 as being unremnuerative. It may be incidentally mentioned here that there is no water in this Mashwa River this year.

The revenue on account of the Khari irrigation is credited to the Imperial Revenue along with the Land Revenue.

Paragraph 6.—District or village works.—There are no district or village works except the village tanks.

These rillage tanks exist from old times, and the villages now and then repaired them; occasionally the District or Tuluka Local Funds repaired some of them.

Strictly speaking, Government are responsible for keeping up these small tanks, but they do not seem to have done unything. In 1892 Government passed o Resolution that tanks irrigating more than o certain area shoold be kept in proper order by Government and oppointed a special officer to examino and report upon these tanks | nothing, however, seems to have come out of it.

No remissions of land revenue are given when the works

No new tanks have been constructed of late years.

There was a project for repairing the ambankment of on irrigotion tank, called the Pania, in the village of Dha-rora in Mater Taluke, but as the Inamders of the village were too poor to contribute anything towards the cost Government would not take up the project. The village has suffered greatly in consequence.

It is desirable that District Funds should be expended on small tanks which Government will not look after.

The protective value of village tanks would corininly be increased by devoting more money and greater attention to their up-keep, so as to make them hold water for two years.

The local authorities may be held responsible for these works, but the increased revenue should be given to them.

Villaga timks in this district are no doobt useful both for men and for cattle. The water is not generally used for drinking purposes, but people generally batho in it. They are useful also insumed as the wells situated near them remain ewect owing to the percolation from the tanks.

Parograph 7.—Wolls.—The lands ordinarily irrigated by wells are as follows in five of the talukas :—

Matar			_				3,717
Mehmade	had		:	:	:	·	4.6.8
Thuara			:	:	:		470
Anand							3,953
Nadiad						•	9,662
The lands i	ricai	ed in	1899-	190).	the v	ear of	drought:

					Acres.
Matar					6.852
Mchmud	bad				10,725
Thesrn				•	403
Annd	,				11,743
Nadiad					17,775

The amount of takavi given in 10 years for the construction of wells ie na follows :

	Takari.	Nomber of wells.
Metar	Ps. 3.145	17
		. 123
Melmadabad		
Thusm	. 26,950	90
Anand	. 23,666	55
Nadiad	40,979	216

There are no concessions given to the constactors of wella except that no extra revenue is to be levied.

It is perhaps not goite possible, though it is desirable to stimulate the construction of new wells by more liberal ad-vances. People do not think that they can make sufficient

Actes.

Mr. B. E. Modi.

use of well weter for irrigation; they'do not feel sore of roising remnnerative crops.

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The lands that were in the sandy alluvial soil did not generally fall during the drought of 1899-1900, but those in the hard rocky soils of Kapedwanj and other talakas failed and held water for irrigation. They were not despensed.

The nverage depth of water helew enrince varies from 90 and 100 feet in villages near the Mahi River on the east of the district to 30 and 40 feet in the alluvial lands.

The cost of wells depends upon the dopth and the diamster. Lorge wells intended for working 4 kes or leather bogs cost from Rs. 500 to Rs. 1,500 according to the dopth; wells of ordinary depth for 2 kes cost from Rs 400 to Rs. 500.

The area served by one well is from 2 to 4 seres per one kes; it depends also upon the nature of the crop.

With regord to the possibility of finding arream wolls in Gajarát no definite opiaion can be formed as our knowledge obout the lower strata at a depth of, say, 500 feet is very meagro. Government should, however, make experiments in the lower tract hetween the peniusula of Rathinwar and Ahmadobad district, becouse it is very likely that the underground streams flow from north-east to southwest in Ahmadahad, and are meeting with the horder strata of soil in Kathinwar.

strata of soil in Kathiawar.

Paragraph 8.—Drainage works.—There used to be water-logging in several villages of the Matar taluka and in some villages of the Anand taluka. In 1830 it is stated the district was unhealthy and the crops saffered, and a system of drainage was earried out from 1831 to 1840, which greatly improved matters. The drain in Motar laluka had silted up about four feet and, owing to the representations of the Settlement Officer, who made the revision of the survey assessment, a scheme had been prepared. It was earried out as a fomine relief work.

#### II. A --General

- 1. The naswers relate to the Koira distrist. I have been sorring as District Dopnty Collector for several years.
- 2. The overage rainfall is each of the mouths of June, July, August, Septomber, and October is as follows:

					inches.
				•	3.63
	•	•			8.83
		•	•		9.79
					6.23
•	•		•		0.10
•					

- 1. Q. (The President)-You are Deputy Collector of the district of Koira?-Yes.
- 2. Q. How long have you been stationed in that district?—Altogether about sixteen years.
  - 3. Q. Then yan know the district well ?-Yes.
- 4. Q. Were you there throughout the last famine?-
- 5. Q. You have some irrigation works in Kairo ?-Yes.
- 6. Q. I understand that they irrigate 8,900 ocres?-Yes.
- 7. Q. But only a very small portion of the district is protected by irrigation ?- Yes.
- 8. Q. I understand that the rainfall in your district has generally been omple?-Yes.
- 9. Q. What was your loss of population by famine?-About one-and-a-half lakhs out of nine lokhs.
- 10. Q.—With the experience you have hed of fumine, what measures would you take to protect your district from it in the forme?—If we could make tanks that would hold water for two years, it would be advantageous.
- would hold where for two yeors, it would be advantageous.

  11. Q Do you think there is nny reasonable belief that tanks con profect you?—I am quite certain they con. In the Kapadwauj oad Thasia talukas where there are andultiag lands, water can be held up for two yours. There are also cortain localities where wells would be n great protection. During the last famins, in Jano and July, wells were used for growing cattle fodder. The season had passed for growing it; it does not ripen in the cold soason.
- 12. Q. (Mr. Ibbetson)—The people grow juari in the cold sesson ?—Yos.
- 13. Q. (The President.)-If there were tanks what would they water from them?-They would water rice.
  - 14. Q. Rice only ?-Yes, generally rice only.

- In the other meaths there is prectically no rain,
- 8. Is there any obsteels to the extension of irrigation nrising from-
  - (1) Sparsity of population ?-Noas.
  - (2) Insufficient sapply of plough cattle !- Nons.
  - (3) Insufficient supply of masuro ? Not much.
  - (4) Unsaitability of soil to irrigation ?-- None .
  - (5) Uncortainty of the enpply of water, or its too late commencement or too early cossation !—The sapply in the Kheri irrigation work is not sufficient after the cessotion of the mins for irrigating more lands.
  - (6) Lack of capital for the initial expenditure, ste.?

    —Capital would be coming forward if there is a certaioty of profit.
  - (7) Fear of calanced rent or revenue assessment?—
    No fear if irrigation is remnnerative.
  - (8) Uncertointy of tounre P-None.
  - (9) There are no other recsons preventing the extension of irrigation.
- 4. Land irrigated from works constructed by private copital orghi to be exempted for over from enhancement of assessment nader the present law. No alterations under the present law are required.
- 5. Loans are not taken freely under the Land Improvement Act for the extension of irrigation, because there are no feeilities for irrigation.

Wells are made from takavi advances.

- (1) There is no necessity to reduce the rote of interest,
- (2) or to remit the interest,
- (3) or to partially remit the edvence.
- (4) There should be total remission is case of failure to obtoin water.
- (5) The present period, 30 years, is sufficient.
- (6) No grants-in-aid ore necessary.
- 6. In this district the ortension of irrigation cannot tend to injure the remaining cultivation by attracting the cultivators to the irrigated tracts.
- 15. Q. Is it o very profitable crop ?-Yes. It is more profitable than any other crop.
- 16. Q. Is rice ever grown under wells? No, but when there is scarcity of water in the latter part of the rains they sometimes use well water.
  - 17. Q. That is lu October ?-Yes.
- 18. Q. When is the rice reaped?—There are two kinds of rice; superior rice is reaped in the beginning of November, interior rice in the beginning of October.
- 19. Q. Does the superior rice crop suffer most in a year of drought P-Yes.
  - 20. Q. Inferior not so much f-No.
- 21. Q. If tanks were mode would the people he reased to teke advantage of them !—Yes.
- 22 Q. They would not decline to uso them?—No. During the last famino they utilized every smoll pond. They lifted water from these ponds and wotored their ries
- 23. Q. The dry orop is obiefly juari !- Bajri and kodva are also grown.
  - 24. Q. Is cotton grown much ?-Not much.
  - 25. Q. What is kodra; is it a millst P-Yes.
- 26. Q. When is juari sown?—In July and Angust; it is grown chiefly for foddor.
- 27. Q. Whon is bajri sown?—In the latter part of June, or sometimes in the middle of June if the rains, are favourable.
- 28. Q. If the crop is sown in Juns and the raios fail in Soptembor would it some to maturity?—Bajri is a very hardy plont and survives for a long time without any water.
  - 29. Q. When is it out ?-In September.

- 30. Q. (Mr. Mair-Mackensie)—Is it tenped as early ns September ?—About the end of September ; it depends upon the time when it is sown.
- 31. Q. In the case of an early erop?—If it is seen in June then it is renped about the end of September.
- 32. Q. (The President)—Is tobased grown on a larga scale?—Yes. It is a very paying crop.

  33. Q. ts it grown by well irrigation?—Yes, mostly under wells. A small proportion only is grown as n dry
- 31. Q. You say there is only one irrigation work in the district which is closed as Provincial ?—I unde a mistoke; I should have called it an Imperial work.
- 35. Q. Is the Khari irrigation work of great value?— Yea very great. It was not of very great valoe during the past fomme; because there was no water flaming, but in odioary years it is of very great value.
- 36. Q. (Mr. Ibbetson)—It increases the wealth of the province?—Yes.
- 37. Q. Would you advocate its extension ?-We have already made as much use of the water as we can. Formerly there was aspecial engineer for the Khari irrigation works, now it in under the Excentive Engineer of the Ahmadabad district.
- SS. Q. You are using all the water that is available?
- SO. Q. (The President)—The only may to increase the supply is by storage?—There was a project for bringing in water from the Mashwaviver, and to have a storage tank near Bokh in the Ahmedabad district.
- 40. Q. In the famine year very little water was loft to the village tanks?—Yes, all the tanks ran dr3, the village tanks were especially dry.
- 41. Q There must lare been great difficulty in watering the cattle?—Yes, they had to be watered from wells.
- 42. Q. Was there great mortality omong the cattle f-
- 43. Q. You say that it is desirable that the District Funds should be expended on anual tanks; has the district got any funds at its disposal?—Money has been spent from the Local Funds on small works. The Kaira District Board is very weolthy.
- 41. Q. Have any tanks been mode by private indivi-
- 45. Q. Is it looked upon as a religious net to make a wall r n tank?—No.
- 40. Q. Hos the last famine given a stimulas to the construction of wells; are people more inclined to make wella than before?—They have been moking some wells.
- 47. Q. Has the number of wells increased !- Very much, chiefly on account of the liberal taken indvances made by Government.
- 48. Q. The people willingly availed themselves of these metacoes?—They did. It is possible that they maiotained themselves to some extent, too, out of three advances. A caltinate who took fis. 400 or its. 500 to make a well, perhaps kept aboot fis. 100 for his own maintenance. We did not exercise any very stringent sopervision considering the hard times the people were passing through.
- .19. Q. What interest does Government charge on these advances?—Five per ceut,
- to. Q. Do you think it would be a good thing for Government to advance money at a lower rate of interest, or even without any interest at oil, in order to encourage the people to build wells; do you think that the people were prevented from making wells on account of the 5 per cent, interest independent of the first people were prevented to not think so.
- f do not think so.

  51. Q. You do not think it is a heavy charge?—Nn, uf course they would be induced to come forward more largely if we remit interest and make greatevadvances of takavi; but as a rule thay are not prevented from applying by our rate of interest.
- of interest.

  62. Q. Yon say, "It is perhaps not quite so possible, though it is desirable, to stimulate the people." Is that on account of their ignorance and indoleure?—They do not know whot paying crops they coold grow from wells; if all the land is irrigated for valuable crops they think there would be on market. Their idea is that if all were to raise garden produce it would become too chiap.
- 53. Q. You say that in some cases the villagors lift water from 90 to 100 feet!—Yes, that is the case in a village near

- 54. Q. Is the water deeper near the river than elsewhere? Mr. B. E.

  -Yes, because the banks are very high; in some places Modi.
  they are 100 feet above the bed of the river.
- 55. Q. At what depth is the water below the surface which they irrigate from wells?—From 40 % 0.45 feet. In Knim there is a town called Dákor where a good deal of garden stops is grown, the wells there are about 40 feet to 65 feet deep. garden crops 45 feet deep.
- 45 feet deep.

  56. Q. Is there any uncertainty as to the proposed afte of used yielding good water F-That depends upon the tract of the constry. In the sentre of the district the people are generally sore of fielding good water. But into western tracts sometimes they get brackish water and sometimes they do not get any water at all at a depth of fifty feet. I know of a well which was annk to fifty feet without water being reached.
- 57. Q. There is genorally one well in each villaga ?-- Yes.
- 58. Q. It is need for drinking purposes?-Yes, but io ome villages there are no wells; the villagers drick tha some villages there water of the river.
- 59. Q. Before making n well do the people employ having tools to see if water is obtainable P.—As a rule they do not; they appear to know where to find water, and work according to old native ideas.
- 60 Q. Supposing the Collector of a district were to lend the people bring tasks, woold thay was them?—I think they would. We had a boring apparatus, but we had no akilind workman to use it, so that we could not use it doring famine.
- corning remaine.

  61. Q. Do they do much in the way of kochcha wells?

  No, except that in the year of drought and during a famine year, they mode many knehcha wells out of the tokuri advances.
- 62. Q. Do they last long?-For one year only, as n
- 63. Q. Do they got takavi advances for kacheha wells?

  -Yes, about Rs. 40 or lis. 50; they can irrigate about 3 acres by the kacheha wells in a taluka ilka Kapadwanj.
- 61. Q. In your district is a programmo of relief-works kept up to date by the Poblic Works Department?—Yes.
- 65. Q. Do you know if there were n programme of that sort ready when the last famine occurred?—There was, bot it was quito insufficient to provide warks for the large number of people that came ou relief.
- 63. Q. When a man irrigates under a well is he charged the wet-rate assessment?—No; he is not charged.
- 67. Q. Not at all ?-No.
- 68. Q. Never?-No, according to the Bombay Revence stere, if a man makes an improvement on his land, he is ot charged any oxtra assessment.
- 60 Q. For all time ?- Yes.
- 60 Q. For all time?—Yes.

  70. Q. That ought to be n vory powerful inducament to the people to make wells?—Yes, very. Doring the revision softlemed when the ald survey assessment was revised, we charged land which was converted into rice hoods according to the vice erop rate which is always higher than the dry-crop rates. Dry-crop land was in reversal places charged at vice rates although the loud was converted ut the expense in the owner himself into rice tands. They thought it was a brack of the promise made by Government that improvements by the people would not be charged.

  71 Q. Has that always been the rule in the Rechain
- 71. Q. Has that always been the rule in the Bombay Presidency? I think that was the rule when the Eurvey Act was introduced in 1865.
- 72. Q. You say that you think that the best way to prepare for famine would be to build tanks wherever it is possible?—Yes.
- 73. Q What do you think abould be done where it is not possible to build tanks?—Wells should be constructed.
- nat possible to build tanks?—Wells should be constructed.

  71. Q. Would you have the wells made by Govarnment?
  —That is a difficult question in answer. I think Gavernment ought to make wells where they think it would be feasible and charge a water-rate. Formerly there were Government wells and when people took water from them they were charged at the rate of its, S per key, and in some backward taluks at the rate of Rs. 5. I think that if the people took water it would be to their advantage, but it may perhaps not be profitable to Government.

  75. Q. It would be no avancies because.
- 75. Q. It would be no expensive business. I suppose that n well under by Government costs a good deel more than one made by the villagers:—No, my experience is the Poblic Works Department can do it as cheaply as the villagers themselves.

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- Mr. B. E. 76. Q. (Mr. Higham)—Supposing Government build tanks, how are they to recoup themselves for their east?—A water-rate of, say, Rs. 5 or Rs. 6 per mat, if they take water by a lift, or if they take water by flow, they might be oharged a rate per core for the area watered.
  - 77. Q. You soggest a charge by mot; what would a mot irrigate?—About four ar five neres where they regolarly
  - 78. Q. You would recover entirely by means of a water-rate f—Yes.
  - 79. Q. You would suggest no increase in assessment P—No, because the people might nat take water every year; they would take it only when necessary.
  - 80. Q. The woter-rate would only be reclised if the prople chose to take water ?—Yes.
  - 81. Q. Would it tend to greatly increase the value of land if lanks were established, and the people kasw that water would be available in a year of dronght P—I think it would increase the value of the land because they would be quito sure that there would be no foilore of oraps.
  - 82. Q. Yon think they would accept the water rate?—Yes, I think that the classification of the soil should not be Yes, I think that the classification of the soil should not be ohanged. There are osrtain classifications and the rates are fixed occarding to those classifications. If there is a revision the classification will be ohonged, and the rates will be increased. The maximum rates for estain classes of lands is Rs. 4. Under the revision it may be increased to Rs. 5 or according to the ti-e in prices.
  - 83. Q. The effect of making tanks would be that it would alter the classification of lands?—That should not be dens; the classification should not be changed, but a general rise in the assessment of the different classes of land should be
  - 84. Q. Would there be on enhanced assessment in case tanks were made?—Not on assount of the tanks; but there will be on enhoncement owing to a rise in prices ernmont would be entitled to chorge a water-rate.
  - 85. Q. You suggest in your memorandom that District Funds shoold he expended on smoll tanks?—Yes, for tanks the water of which is supplied to the villagers.
  - 86. Q. (Mr. Ibbetson)—For drinking water?—Yes, for the people and cattle.
  - 87. Q. Not for irrigation ?-No. Now and then money has been spent upon irrigation tanks.
  - 88. Q. (Mr. Higham)—Very small emounts, I suppose?
    —Amoants of Rs. 500 or Rs. 600. Only when it is certain that Government will not do anything if tanks are mode from Local Funds.
  - 89. Q. It is the exception to moke tanks for irrigation ?
  - 90. Q. These tanks, I suppose, irrigate only a very smell rea ?—Yes. area P-
  - 91. Q. And that in the neighbourhood of the tanks?-
  - 92. Q. If irrigation is carried out under these tanks, can the District Boords charge n water-rate?—They have no power to do so.
  - 93. Q. Then do you soggest that the District Boards should make these tanks and not charge for the water ?— What 1 meon is that if these tanks are maintained altogether by Local Funds the water-rate abould be given to the Local
    - -They have now no pewere to take it ?-No.
  - 95. Q. Government cannot take water-rate from tanks unade by Locs! Finds F—Government do not charge unything because those lands which are under tanks are already assessed to wet rates. Witter-rate is not shown separately, the land and water-rates are grouped together.
  - 96. Q. (The President)—Da you think there ought to be only one rate?—Yes, if tanks are maintained permanently, then only I think water-rate ought to be charged.
  - 97. Q. (Mr. Higham)—Do I nuderstand you to recommend that the local authorities should make a number of tanks and that they should be given the difference between the wet and dry rates?—I should prefer Government to have charge of oil tanks; hot if small tanks are given over to the local authorities then the difference between the dry and wet rates should be transferred to the latter.
  - 98. Q. Have the members of District Boards local knowledge of the districte-They know their districts very well. The Board is composed of persons from different talukas, i.e., one man is elested from each taluka by the people themselves.

- 99. Q. There are also members adminated by Government, do they know the talukas well ?—Yes.
- 100. Q. The members, I suppose, are land-owners? Yes, they are generally village bendmes.
- 101. Q. Yan say large numbers of oattle died from want of fodder?—Yes.
- 102. Q. Did they also die from want of water ?- I do net thinh eo; there was some water in the wells.
- 103. Q. Did the peeple take the eattle to the wateriog places?—In this district they have not to take them to any great distance; because in the Nariod talaka there are wells near the villages, and water was drawn from thom for the cattle to drink, because most of the tanks were dried
- 104. Q. Was there mny water nvailable in the river?—Yes, the river was flawing, but it was nt some distance. In the Sabarmati river water was flowing, but the people did nat take their cattle to the river when it was distont.
- 105. Q. What is the rule about the mointenence of these 105. Q. What is the rule about the mointenance of these tunks; are the people supposed to construct and meiatain them P-In 1892 Government appeinted a Committee to enquire into this very sabject, and in 1995, they passed a resolution in which it was laid dawn that those tanks which did not yield a certain monant of revenue aught to be abandoned and left to the people themselves, and that the larger tanks should be taken up by the Engracering Department; but nothing was danc in our district.
- 106. Q. I suppose after abandoning them no large sums were epent on them  $f = N_0$ .
- 107. Q. What happened doring the famine of 1899?-
- 108. Q. And spent money on them ?-Yes.
- 100. Q. Was everything possible done for them?-Yes, during that time.
- 110. Q. They were all put iato very good order?-Yes, most of them.
- 111. Q. Havs you a programms of relief-works ready in cass of emergency?—It is with the Public Works Department. It is very difficult generally to keep up a programme.
- 112. Q. Have you a programme ready now; suppose you should want it for famine relief works?—I have already made a programme of smoll relief works, and sobmitted it to the Collector become we require small relief works this yeor also.
- 113. Q. What are the powers of the Collector of the district in preparing a programme ?—It is prepared by the Collector and sent to the Public Works Department for approval with regard to technicalities.
- 114. Q. The initial propesal is made by the Collector ?-
- 115. Q. It includes all village works?—Yes. The lorger rojects are prepared by the Executive Engineer, Public Worke Department.
- 116. Q. You mention that in the Moshvo river there is no water?—Yes, that is the case this year; last year also there was very little water; its bed is entirely dry et present.
- 117. Q. Was that the cass throughout the mousaou ?-I think in the beginning of the monecon it was flawing, bat I found it dry two months ago.
- 118. Q. You had a little water in the beginning ?-Yca.
- 119. Q. The rains stopped early ?—We had rains in the beginning of July and they stopped in August.
- 120. Q. After that no water ceald be got out of this river?—No.
- 121. Q. (Mr. Ibbetson)—What river do you refer to ?— The Mashvo. But there is also the Vatrak river. In this, in ordinary years, there is a good deal of water flowing throughout the year.
- 122. Q. You had a good sapply during the rains?—Yes. The supply in the rains never fulls and could be used to fill tanks or depressions. The river is rather deep; and the hanks are high in several places.
- 123. Q. How high?—Ahaut 1a or 20 feet, and semetimes 30 feet. Generally the level of the country is higher than the bed of the river; the banks in most places are generally very steep.
- 124. Q. (The President)—Is the land higher than the suke?—They are on n level generally.
- 125. Q. (Mr. Highum)—Yau say that wells if mode would cost a great deal?—Neer the Mehi river they would have to be very deep and would in consequence be very

- 126. Q. (Mr. Ibleison)—Would you edvocate large storage tanks?—Yes.
- 127. Q. Large enough to store a two years' supply ?-Yes.
- 123. Q. Suppose you had golf-rater enough for two years, and that in the first year the people had used built the water and were ready to use more; would you refuse to give them more water so as to provide for a possible famine?—No, we not not likely to have another famine for a long time. I should give out the water.
- 129. Q. Sappore you made a tank to hold a two years' supply; if the cultivation below the tank were to be extended, would you supply the new area with water but of your second years' storage;—We would not allow more hand to be irri-
- 139. Q. Why not ?-We would not know whot kied of a year was before us; it might be a dry year, oud we ought to he prepared for it.
- to be prepared to it.

  131. Q. Would you refuse water for oultivation on the change of the next year being a year of drought?—Yes. I would refuse to extend cultivation for fear of the next year being a year of drought.
- 132. Q. How many years of drought have there been within the last 30 years in Kaira?—Three years; 1877, 1899, and pethaps this year.
- 133. Q. You had two years of drought out of twenty-five ?-- Ves.
- 134. Q. Thore have been very few famines?-Yes.
- 135. Q. If you stored water in the hot weather for next year's cultivation there would be very great lose by evoporation ?-But that would be calculated.
- 130. Q. Would you refuse woter stored in tanks for new enlitvation below the tanks on the chance of the next year being a year of drought which only comes once in 12 ar 15 years, and nowith transing the loss by evaperation?—Yes; we have suffered so much.
- 137. Q. You say that on the tanks they practically grow rice only ! Yes.
  - 139. Q. Rabi crops might also be grown ?- Yes.
- 139. Q. Would that be on the same lands?-Yes, after the rice is reaped.
- 140. Q. The crop is not nearly so good as that grown na separate and ?—No, not so good.
- 141. Q. Why do they not grow the rabi erop on separate had?—The people teks the climace of hoving two erops, generally.
- 142. Q. Would it not pay them better to have rabi on separate land !—No.
- 143. Q. Why is that !—The value of rice crop is o-nel-detable, and so rice is grown on overy field they have.
- 144. Q. You say that in a famino yeer all the village tanks dry up?-Yes.
- 145. Q. Did you get ony erop sown in the maint lands in the beds of the tanks 9-1 know of only noe village, Alina, where crops were sown in the beds of the tanks.
- 146. Q. Are wells made in the beds of tanks !- In some places the people do make such wells; they take up water from kerheha wells in the beds of tanks and irrigate some of the lands. They get very sweet water in such wells.
- 147. Q. Do tunks affect the lovel of water of the sarounding wells ?-Yes.
- 148. Q. You sey the District Bourd ie rich in Koira? -
- 149. Q. In the famine year they had, I suppose, a very mall income f-Yrs.
- 150. Q. If they were well off why have they never done unything for the tanks in the district f—They have been repairing touks used for drinking purposes for eattle. They have made no irrigation tanks. In very rare cases they bave repaired irrigation tanks.
- 151. Q. Sappose n mon wanted to make a well and the Nine per cent.
- 153. Q. (Mr. Muir-Mackenzie)—Not more than that?
  -At most 12 per cent; the rate of interest is not very high
- 163. Q. It depends, I suppose, upon the class of the cultivator who mants to borrow?—Yes.
- 154. Q. (Mr. Ibbetron)—What rate would the ordinory cultivator have to pay!—Nine per cent.; sometimes they get it at 6 per cent.

- 155. Q. You think that the 5 per ceut, charged by Government is no obstsele to the extension of wells?—I don't think it is an obstacle.
- 153. Q. Do you mean that if Government were to remit the interest to-morrow, people would sink more wolls than if Government did not remit the interest?—One cannot be sore, I think if Government were to tell the people that they would be charged no interest they might be induced to make well.
  - 167. Q. Woold many roms forward !-Yes.
- 168. Q. You say you had bering tools, but that the prophe did not use them; was that because you had no experts to work them?—You.
- 150. Q. By boring tools do you mean tools with which you make a hole to test for rock hofore sinking a well?—We had an instrument called a "jumper." The people could not use it.
- 160. Q. Was the apparatus a drill with which n small hole is made to see whether rock is found, before sinking a well?—Yes. The natives too have such an instrument.
- 161. Q. Do they find them neefal?—They are not much stailed of. The people generally know where to sink a well. They do not, therefore, use these tools though they might prove useful.
- 162. Q. Do the people know of the existence of three drills?—Yes, there are native workmen in the villages who make borings in the bottom of the existing wells in order to tap better springs, but on the surfoce of the land they do not uso boring apparatus.
- 103. Q. What size of helo does the drill make?—About 4 or 5 inches in diameter.
- 164. Q. You say that the people have not much confidence in the promise of Government that no essessment will be imposed upon improvements on their land?—Yes.
- 165. Q. Is there no law or rule exempting private improvements from assessment?—They feel that there is no gustentee that Government will not enhance the assessment.
- 106. Q. If the term of exemption were fixed at 30 years, would they be satisfied !-- No.
  - 167. Q. They would like to take their chance ?- Yes.
- 168. Q. Rather than have a dofinite relief for so many care?—Yea. years?
- 169. Q You suggest that Government should make wells and cherge, say, Rs. 8 per kes P—Yes.
- 170. Q. You would not have Government make wells in private haldings without the consent of the helder ?- An,
- 171. Q. Do you think the holders would agree to Government coming in and making weth on their lands?—Xes, they would; because they would have to pay nothing unless they took weter.
- 172. Q. Would not the cultivator object to Government subordinates ontering on their lands to dig wells [-] do not think they would object. They would be only too glad to horo wells in their fields, because they would be quite sure that they could get water whenever they requir-
- 173. Q. They would rather hove that than take money from Government and dig wells themselves?—Yes.
- 174. Q. What does a well cost?—Rs. 500, but it depends upon the diameter of the well and on its depth.
- 175. Q. Government would only get Rs. 5 to Rs. 8-8
- 175. Q. How mony kee would a well have ?-About four kee; two on one side and two on the other.
- 127. Q. De you think thei Government ought not to change the classification of the lund; is not this the rule?—
  I think that is the rule now made; there is a general clause that ou all improvements mode by Government no extre rate is to be charged.
- 175. Q. There ere mong years in which u man ic doubtful as to whether he will take water for his rice erop. Many
  mrn I suppose hold off from taking water in the hope of
  getting rain and refuse to take water, because they have to
  ray a rate?—Yes. The people might he induced to take
  advantage of the water if a reasonable land revenue were
  fixed. If that were the case they would take adventage of
  the water as soon as possible.
- 179. Q. Surposing Government were to allot to the Die-trict Boards a portion of the reveaue or allow them to take part of the water-rate, do you think that they would do

- Mr. B. E. any thing in the way of helping tank irrigation ?—I think Modi. they would.
- 180. Q. They could repair the tanks ?-Yos. 2 Dec. 01.
  - 181. Q. Scattered tanks and small taoks managed by the Poblic Works Department would be very expensive; do you think that the District Boards sould do this useful work !- That is what I have suggested.
  - 182. Q. Why do they not do it; I suppose there fe no want of money?—They bave to spend a good deal of money upon reads. We spend rather less upon tanks hecause we do not got any revenue from them.
  - 183. Q. Supposing there is a logal difficulty about the District Beards dolog this, do you think it would be a good thing to remove any disability that may exist?—I think It would be a good thing to ahargs the water-rate and to spend money from District Lecal Fonds on irrigation works.
  - 184. Q. For instance all those small tanks which Government has decided to abandon might be usefully repaired by the Dietrict Boards ?—Yes.
  - 185. Q. Would the tanks pay for their repairs ?-- I do not know, hecaes io some cases very small areas are Irrigated-only half nere or no nere or so.
  - 186. Q. Are they for drinking purposes?—No; they are used for irrigation; they are far away from the villages.
  - 187. Q.—I soppose a good many of them would pay; that is to say, the difference between the wet and dry assessment would be more than enough to keep the tanks he -Yes; I think so.
  - 188. Q. Have you got a programme for village works?

  - Yes.
    189. Q. Does that inclode small village tanks?—Yes. 190. Q. In a good year is water available in Kaira? Not alwaye, though there is always a demand for weter.
  - 191. Q. In on average year?-There is oot a large demand, except for rice.
  - 192. Q. The demand is only in a scanty year?-Yes.
  - 193. Q. In ordinary years is the domand equal to the upply of water arailable in Kaira for irrigation?—I think copply of water a The water is not used up except in the wort of the district.
    - 194. Q. That is your experience !- Yes.
  - 195. Q. Have you got figures for the areas irrigated in 1899 and 1900?—Yes. Here they are.
  - 196. Q. I oco that the oreas of fodder are doubled and in some cases trobled P-Yes.
  - 197. Q. What was the reason for that icorcase?—All the cultivators tried to grow fodder as much as possible.
  - 198. Q. In ordinary years wells might be used for irriga-ion?—Some wells were used.
  - 199. Q. You say some wells were used?-Yes; many wells are not used in ordinary years.
  - 200. Q. Why There is no demnnd. Gram is only grown to noy considerable extent in the west of the district. They grow pulses, aveo though there are wells they do not use them.
  - 201. Q. You are speaking of wells as well as of tanks? -Yes.
  - 202. Q. The wells are sometimes not used at all?-Yes.
  - 203. Q. Then it woold be somewhat risky for Government to undertake the construction of wells !-- Yes. The people will not sick wells because they are not quite sore that they will require well water always.
  - 204. Q. Would they like Government to do it for them?
  - 205. Q. Are there many kachcha wells dug?-Yes.
  - 206. Q. They were not all disused ?-No.
  - 207. Q. The area irrigated by kachcha wells is very mell?—In some talukas, I thiuk, it was very considerable in the famine.
  - 203. Q. The cost is Rs. 50 for a kachcha well, and it lasts for ten years?—Yos.
  - 209. Q. Is a leother bag and a rope included in the Rs. 50?—Yes, cod they sometimes spend their takavi money in cods alco.
  - 210. Q. What do you suppose to he the actual cost of diggiog a well?—Ahoot Rs. 10 to Rs. 15.
  - 211. Q. You say the area served by one well is from two to four acres per kes?—Yes.

- 212. Q. It seems to me to be an extraordinarily small nren?—Yes.
- 213. Q. What sort of erop do you get ?-Tabacco, sugaroaco, and vegetable.
- 214. Q. Does not the irrigation of arops like juari and bajri pay when it is from wells ?—They do pay.
- 215. Q. At present it seems to me that all irrigation is confined to the richest crops ?—Yes, but in coils which are solitable for wheat that crop is irrigated.
- 216. Q. Are rabl crops irrigated in this district ?—Yes, in the Mater talnka wheat is irrigated, and the yield is two or three times the average yield of unirrigated wheat irrigated onder wolls.
- 217. Q. Suppose you were irrigating rabi crope by means of a well; how many neres would be irrigated?—I think from three or four acres per kee.
- 218. Q. If two or three acres of vegetable and rice can he irrigated, surely at least dauble that area of wheat should be irrigated; woold not the area be very much larger?—It would not be more than four acres.
  - 210. Q. Not mere than that ? -Nn.
- 220. Q. (Mr. Rajaratna Mdlr.)—In your memorandnm you refor to rice lands irrigated by wells; what do you refor to?—I refer to dry laudo made into rice lands by making hands round the fields. The rate was increased upon those lauds, because they were converted into rice lands and rice would be grown upon it.
- 221. Q. How many kinds of rice are there?-Two kinds. Akathra and irrigated rice.
- 222. Q. (Mr. Muir-Mackenzie)-In the Mater taluka, we have new passed an order to strike off the increased assessment?—Yee, on account of local conditions.
- Mr. Muir-Mackenzie explained that a slightly increased rate is charged on now rice lands, but not nearly so high as on old rice lands. The difference was the same between that of old and new wolls.
- 223. Q. (Mr. Rajaratna Mdlr.)—You soggest that the tanks may be handed over to the District Beards ?—Yes.
- 224. Q. Would it not he better to hand them over to the villagors who are mach more interested?—No, because there are very few cultivators. There would be only one or two cultivators who would be keen on the subject.
- 225. Q. If there were two or three ther would be better interested than the District Boards?—They would not take them; they think that it is the duty of Government to do everything for them.
- 226. Q. Suppose you reduce the assessment by say 15 or 20 per ceet, and hand the tanks over to them?—They would become more careless.
- 227. Q. Do you know whether the District Boards repair tanks which are used solely for irrigation purposes and for no other?—I think there are some tanks which are used simply for irrigation that they have not repaired.
- 228. Q. What was the objection ?—The District Boards were not justified in repoiring them, but out of pity for the people they have done it in some cases, as it would be a pity to allow old tanks to go out of repair altogether.
- 220. Q. The tanks had been osed for drinking purposes?
- 230. Q. In paragraph 1 yoo say that no water-rate is charged for water taken from a river?—Yes. Formerly the people had to pay what was called the dhekhudi coss. At the time of Revision Servey, Government thought it advisable to remit that coss for taking water from the river.
- 231. Q. Does that apply to all rivers, or specially to one river ?—To all io the Kaira district; and if I mistake not, it is applicable to the Ahmadabed district also. There was a good deal of correspondence about it with Mr. Oznoce, Director of Agriculture, who was of opinion that no water-rate should be charged for taking water from the rivers, in order to accourage irrigation from them.
- 232. Q. In the same paragraph you make a reference about wells. Poes that refer to Government wells?—They might have been made by Government. I say that the people who had been entilled to use water from these wells ought not to be charged a water-rate.
- 233. Q. Lands under wells according to the Bombay settlement are not liable to enhancement of assessment?— Yes, because the classification connot be changed.
- 234. Q. Not at the and of the settlement period ?-No olnesification can be changed.

- 235. Q. The classifications are never altered f-No.
- 236. Q. What then is this enhancement due to ?—Tho general rise in prices and certain other considerations.
- 237. Q. If there were no enhancement under any conditions, would that given stimulos to the extension of wells?

  —It would under the present settlement.
- 233. Q. You refer to a guarantee being given that there will be no enhancement. Do you think that that would result in inriher extension of wells !— There would be, but that would be precisedly a permanent settlement and whether it would be advantageous to the country or not I cannot say.
- 239. Q. Are any facilities giren for the construction of canals by private capitalists?—No concessions except that nothing will be charged on account of unprovements on the kind.
- 240. Q. Supposon canal were constructed from a river, would there to no charge for water ?—No, not under the present law if made by presse persons.
- 241. Q. That should be a sufficient inducement?—Yes, I think so.
- 212 Q. How is it then that there are so few causis ?— There are no facilities for constructing them.
- 213. Q. (Mr. Muir-Mackenzie.)—In ordinary years the dry crop is pulse i-I think so.
- 244. Q. Is there a very large area under rice coltivation which is not commanded by tanks f-No.
- 215. Q. Somo rice crops depend entirely on rain ?- Yes.
- 216. Q. You think it would be a decided advantage if n very much larger proportion of area were irrigated by tanks?

  —I think so.
- 217. Q. If tanks were provided for rice cultivation, would they ensure protection against the ordinary fluctuation of the senson?—Les.
- 218 Q. For instance the rainfull in Kaira is between 16 and 60 inches ?—Yes.
- 219. Q. In the year of 16 inches minful would not the rice lands, irrigated by tanks, have a considerable advantage ever these which are not irrigated by tanks P-It would depend upon the expectly of the tank; if the tank were dry, 10 inches of rain would not fill it.
- 250 Q. Suppose in a rear when 16 inches is the rainfall—that is not so bad as in the famine year you had only four inches and the tanks were not full—that the fall were distributed over the period of two months, would the tanks to filled up and wand the water be of use to revive the dry lands?—I cannot say.
- 251. Q. On the other hand if the rice crops had not had the benefit of the tank they wight bave withered ?—Somotimes it happens that with a lattle percolation rice lands rotain a good deal of moisture.
- 252. Q. As regards ordinary years you say that rice is gramm under tanks ?- Yes.
- 233. Q. Then would it be fair to draw from that the conclusion that it would be ndvantageous in n famino year to construct rice tanks as a useful form of famine relief work?—We have been doing so.
- 254. Q. (Mr. Ibbrison.)—You are not making a single one this year because they are too expensive; do you not think it would be advantageous to make new once?—I thak the cast is too heavy. They would be very advantageous if we could dig them at a low ecot.
- 255. Q. Having regard to the fact that they woold give employment to famine labour, do you think tanks woold be an advantageous form of work?—Yes.
- 256. Q. Perhops you could spend your money better in maintaining old tanks than in building new ones ?—I think so.
- - 233. Q. New tunks for rice irrigation?-Yes.
- 250. Q. A great many kachcha wells were made during the famine year?—Yes.
- 260. Q. Were they made mostly from tokari advances or from mensy-lenders?—Bostly from taken advances.

- 261. Q. In what month did the people take it—is Nov- Mr B. I. ember !—Early in October—the begunning of October.  $M_{c,h}$ .
- 262. Q. In your table of rainfell in Kaira you show that in October you had only 10 cents, and 6 inches in September, and practically none after that f—Yes.
- 262. Q. Therefore it was not possible to find out in September whether famine was imminent?—Nn. This year we knew by the end of September. In 1899 we had no rain in July, Angust, and September.
- 261 Q. In that year you had hardly any tain worth speaking of after September?—Yes.
- 265. Q. Therefore, if up to September, you had a very bad rainfull you could coollode that there would be fumino?—
- 266. Q. Therefore, would it not be the best policy to begin distributing talari from the beginning of October P—I think ft would be.
  - 267. O. For kachela wells?-Yes.
- 263. Q. As regards other wells earld you tell us whether they irrigate from each well a larger area in famine year than in an ordinary year  $\hat{r}-1$  think they do.
- 269. Q. In that area they grow principally fodder?-
- 270. Q. The loss of cattle was enormous ?-Yes.
- 271. Q. The value of wells was very great in saving the cattle?—Yes; many people were able to save their best bullocks.
- 274. Q. In this particular district in which Lackcha wells cannot be easily constructed, as room it is feared that famine is imminent, would it he advisable in good years to multiply the number of wells as largely as possible in order that the cattle might be preserved if a famono occurred?—Yes; it would be advisable to have a much larger number of wells.
- 273. Q. Have you ever heard of a system in the Kathiauar States where the State estimates the approximate cost of a well and gives the money to the cultivator who has to produce a certain amount of water—so much per kees or so much per acto. It would amount in practice to Government paying for a well while the entireator constructs it?—
- 274. Q Would you advocate the latroduction of such a sistem here?—I think, it would be better if Government itself made the well.
- 276. Q. But the cost would be much grenter?—I do not think so. I expect that the Public Works Department can build them at a fair price; I do not think that they would spend much, generally they make very pakka jubs. If they are made by the people themselves they would go out of repair in a very short time.
- 276. Q. Do you think it would be a good thing for the District Boards to be evo powered by law to levy a tank revenue; would that attinulate the people to tanks tanks?—Do you mean making new tanks?
- 277. Q. I mean small rice tanks?—Generally, there are small hollows everywhere which can be utdized for growing rice. Such small tanks I think may be taken charge of by Local Beards.
- 278. Q. Went do you menn?—Their repairs should be carried out by the Local Boards who cook collect the revenue; they ought to be considered the property of the Local
- 219. Q. You say people have not perfect confidence that their assessment will not be enhanced if they make tanks. Why is that 2—Up to this ince the people have had very little cumbence. But they are gradually cetting to understand the policy of Government. This say that if they enever their dry crop lands into rice lands by their own labour they neglit not to be charged enhanced assessment.
- 280. Q. Yon say they have been discooraged. Do you know what is the proportion of these rice lands?—No.
- 231. Q. In one taluka, the Chikhli taluka, they inercaved 40 per cent. of the old rice area by tanks?—I am not aware of that
- 252 Q. Do you know whether there is any complaint nbant water-logged lands?-Yes; this year they complained. They say it is because the mins were not heavy.
- 253. Q. Da you think drains ought to be made?-Yes.

75r Behechar des.

# WITNESS No. 9.—SIEDAE BAHADUR BEHECHARDAS VEHARIDAS DESAI AF NADIAD.

Answers to printed questions. .

Culturable and irrigable areas, &c.—Irrigation chiefly depends upon the season, condition of the soil and the nature of the crops to be irrigated. In tha hot weather crops or a watered every 4th or 5th day. Bat in ordinary censons the interval between the two waterings veries from 6 to 15 days. The following are the principal garden crops and the average waterings they require:—

. 20 waterings from Moy to Giager January. . Do. 34 to 40 Turmeric . do. waterings 11 Surgaroane months during the year except in mouscon.
O waterings from Moy to 20 December. Sweet polotoes . 12 waterings from Ootober to March.
14 woterings from September Chillies to March.

14 wotorings from November to March. Brinjals Onions Garlie to Marcn.
 to waterings in good sensaa.
 Mors waterings are required in years when there are an late rains.
 to waterings from November to March. Tobacco Potatoes .

to Morol

2. Sometimes it is feared that the extension of irrigation 2. Sometimes it is feared that the extension of irrigation will tend to injare the remaining caltivation by attracting its cultivators to the irrigated treets. The cultivation of garden crops requires comething more than the mere presence of water though that is the chief thing. It requires a sufficient supply of manure, working cattle, suitable coil, capitel for initial expenditare, &o., &c. Construction of welle in all fields ar having a casal near by will not necessorily ottract people to plant gorden crops, to the neglect af the cultivation of ordinary crops. There are some caltivators, though few, who have got their own wells hat caunot use them, either the water or soil being unfit, or having no each means as working cattle, manure, &o. But having no each means as working cattle, manure, &c. But there are many cultivators who have get all the other means there are many cultivators who have got an encourse, and the thet water, because the construction of a well requires a good deal of moncy. It is for these oultivators that encouragement in constitution of wells is accessary. If encouragement in constitution of wells is accessary. It a sound passes through a district perhaps there will he rush to caltivota lond under that canal, leaving some waterless tract unoultivated. But there are no reasons why a cultivotor should not try his luck in some better district if he has got means instead of spending his whole life in misery and labour. The land thus left annolitizated will he if he has got means instead or spearing an instructed will he atilized by such cultivators who have not got means or enterprise. There is great scopa for encouraging the construction of walls averywhere without nationpoing any fears or difficulties.

fears or difficulties.

S. It is quite essential to give liberal advonces and indicemente to encourage the digging of wells. Insufficient odvances, delay in receiving them and stringent rulee in recovering them prohibit a cultivator from taking advantage of the Government takéwi. He profoss a loan from a sowcar to o takéwi advance from the Government. As an indicement Government should recover only half the advance, and the remaining half should be written off. When o cultivator applies for the takáwi advance for the construction of a well, hie field should be impected by a Government officer, and in consultation with the cultivator, a place for o well should be marked out. When the accessary conditions for giving a takáwi advance no fulfilled, the requisite amount may he givan to hum. When the cultivator roports that the digging of the well is finished, the Government officer ehould again go thore and give him a completion certificate. As econs as the coltivator shows the completion certificate to the officer who recovers the amount, tion certificate. As soon as the coltivator shows the completion certificate to the officer who racevers the amount, helf the advance abould be written off and the nther half recovered in due course. It such inducement is given, many enltivators will come forward to dig walls. Distribations of advances abould of course he in charge of some high poid officer. On the nther hand, in e place like Radiad, where tobecco is, the obiof gardae crop, such inducements will not anecoroge coltivators to dig wells. Here the value of a well depends upon the quality of woter it contains. There are some wells whose waters are well known for their manuried value. Coltivators, even of a greet distonce, toke water from these wells. Lands wetered from these wells do not require any monnre, and can grow tobacco successfully for many years. Some of the

tchacco enlivators have meens to dig wells of their own. But what ther feer is the theoretainty shout the quality of water they will get. If they get salt water they consider themselven fortunate. But if they get only sweet water their money is lost. Then they have to leave tobacco cultivation and try some ather ganden crops, which are not so remunerative. Instead of trueting their fortunes to such nacertainties they prefer to water their tobacco from old wells which ora well tried.

4. In tracts where the water level is too deep, or that construction of wells is difficult, it is highly desirable that Gavernment should undertake to construct wells. The water of the wells must be carefully selected. Gavornment should undertake to construct wells. The place for such wells must be carefully selected. The owner of the land in which a Governman well is constructed should have the free use of water, and other oultivators who take water from that well shoold he charged ac ordinary water runo for the nee of the woter. If the owner of the hand interwards wishes to parchase sech a well, he should be abla to do as after paying the full amount spent in coestracting the same, and Government should forego all claims over the well. Toe owner should then he free to give water to attend the rultivators and charge them for it. nther cultivators and charge thom for it,

nther cultivators and energy enom for it.

5. As a temporary measure cultivators dig kaoheha wells to irrigate their crops. They are a protection against drought to same extent, but it is not permanently. Kackcha wells do not last long. No special ancouragement is required, as kackeha wells do not cost much. They cost only labour. These wells oro dag by the onlivators thomselves with their home labour. It will be a good thing it local famine labour were employed in digging such temporary wells. temperary wells.

6. A good many wells which ran dry during the list famine were deepened and they got emple water. It is generally the practice to deepen a well which runs dry and it is sure to have more water. But in cases where quick-sand layers intervene further digging is stopped, hecase the wooden chakker, an which the whole construction rest, can be no longer pashed downward. Such wells are abandacad. The effect of the fomine of 1899-1900 on the woter local is amarkable. The water local is a copy down from 3 deaed. The effect of the fomine of 1899-1900 on the woter level is remarkable. The water lovel has gone down from 3 to 7 feet, and, therefore, it operates very hard on the working cottle. The same hullooks are not now able to irrigate from the same well in a doy the same area which they used to water some two or three years beek. The average depth of water is 40 feet. The cost of constructing a well with one kes is 8300 and will two kes \$1400. Three acres are generally irrigated by a well in ordinary years. In this district water from the wells is raised by ordinary kes or water bag. One kes, two hullooks and three men toke from 3 to 4 days to water an agre. 3 to 4 days to water an acre.

7. Reports from Mr. Crimp, and other Geological officers, nre rather discouraging as to the construction of artesian wells in Gujarat. This is a question of much importance and should not be shelved without complete inquiry. In Thasra, Knpadwanj, and other talakae, where the coil is of a different nature, artesion wells are feasible. Anyhow the trisl of digging artesian wells is worth nodertaking.

s. Black soil.—The black soil of Kaim Varies from that and Broach. Small tanks constrocted in this soil will hold water. High northen dome can be made of it without masonry walls. In this district the greater part of black soil is under rice cultivation. In the seeson with a well distribated average rainfall, rice does not require ony artificial irrigation. But in oyear like the present, rice requires water. Baing namble to abtain water either from tanks or wells, many fields ore allowed to dry. In each a seeson enlivators water their rice fields with well water, if ovailable, even at a high cost. There are some tanks already in existence in this black soil. Government takes o water rate from the cultivators for the area watered from these tanks. These tanks have not heen repaired for many years, and os the nature of the soil is rather sandy, they are filled up with silt. They do not hold as much water as they ought to. Besides, Government leases them out to cultivate water ploats sand as singoda in the rainy season. Singoda requires much water sad the effect of all this is that when the cultivator requiras water for his drying crope he cannot got it, os by this time the water level of the tank has gone down. If these tanks are constructed for the use of the cultivators from whom Government takes water-rates, they most be repaired and they should not be leased oot for the onlitivation of singoda. As the rains in recent years have become very irregular the construction and repair of taoka 8. Black soil.—The black soil of Kaim Varies from that

in the black coil is in portant and it will in future he

- o. Government Irrigation Works.—In the Kaira district water from the Makican be ntilized for irrigation purposes in the lerge tract through which the Maki paves, where the depth of water is more than 100 feet. It has already been auggested to have a storage lake. A storage lake is possible in the south of the village of Nandgamadm neor Sastapor, where three small rivers meet. Weter from this lake may be utilized 20 miles for irrigation where wells are carree. It is highly desirable that works of sach a usture should be pravided from the Impeliat funds.
- 10. Drainage Works.—There are many villages in the Kaira district where crops are injured by water-logging, for example, Karsanda, Vadial, Karamead, aome villages in

the Theorem to lake, etc., etc. Additional drainage works, both on sanitary and ogricultural grounds, are necessity to improve the bealth of the people and to incress the fertility of the soil. Fever attacks each and every man in these law-lying places. September and October are the chief months for the harvest of the khorif erops. During these meaths it is very important for a outlivater to match his fields and see that all his crops ore properly harvested and brought home. But unfortunately at this particular time he gets ferer end he is obliged to leave his crops to the mercy of hirds, rate and other sanimals. Sanitary drainage will not only improve the health off the villegers but it will also increase the increme of the land. Drainage works will not increase the Government revenue, but there is certainty of recovering the assessment from the cultivatures profited thereby.

Mr. Beheckar-2 Dec. 01.

- ' 1. Q. (The President.)-I understand that you belong to Kaim?-Yes, to one of the towns in the Kaira district.
- 2. Q. I believe you own property thera?-Yes.
- 3. Q. You say that "In the hot weather crops or watered overy 4th or 5th day !"-Yes.
- 4. Q. You refer, I suppose, to well irrigation ?-Yes
- 5. Q. You have no irrigation from tonks ?- No.
- 6 Q. Nu uhannels ?-Nu. In the Kairo district there on canals. In the Matar taluka tanks are not used for
- 7. Q. Dn ynu consider that irrigation is restricted on account of the deficiency of manure?—I believe that menure is needed, otherwise by annual waterings the suil becomes poor and will not yield a good crop. The soil in Koira is sandy, and without manure good crops cannot be mised.
- 8. Q. Your villago lust an immonse quontity of cattle during the famine?—Yes, for want of fodder large numbers of the cattle died.
- or the cattle died.

  9. Q. What do you think would be the best measure to take to protect this district egainst onether famine F-I have auggested to Mr. Ozanae and to other ufficere that one-fourth of the Gavernment land that paye full essessment should be kept under feedder and grass oad that the load should ha chorged bolf the foll assessment; if the people enlitivate that land then double the fall assessment should be charged so that cultivators will be obliged to grow fodder on the land. The condition of the earlie would then be good and they could till the lands well and botter crops would result than at present.
- 10. Q. Has this ever been done?-No; it has not been
- 11. Q. Would not grass he destroyed by want of rain?

  Nu; I suppose that in the case of each crops they get
  come moisture from the almosphere.
- 22. Q. You eoy "there is great acope for encouraging the construction of wells." Do cultivature find it easier to horrow from the sowcer f—They prefer the cowear to Gorenment, although the interest which Guvernment charges is as law as 5 per cent.; hat they prefer to pay a bigher rata to the sowers because they get money from that sower instantly. If they apply to Government for n loan it takes some time before they get it.
- 13. Q. How lung does it take to get a loan from Government?—Not less than two moaths. The saaction of the Collector is required and other things.
- 14. Q. Has any maner to be paid to anyme in order tuget the laan passed f-I have no personal experience; hot I have heard of many instances of that kind.
- 15. Q. (Mr. Hibetton.)—Two months would not make if a well was wanted and the cultifatur had no hullock to keep?—At present if a cultivator applies in Morch or April he will get the lean in June, which is necless.
- he will get the lean in June, which is necless.

  16. Q. (The President)—Would it be an inducement if Government recovers helf the advance and remits the other hall. Suppose a man borrows 18. 200 and Government hall. Suppose a man borrows 18. 200 and Government half the inducement of respiral to the vell is thoroughly completed and is used for agricultural purposes. Full recovery should be made if the well is not properly constructed.
- 17. Q. lon say that "the water level is too deep." How deep?—Sometimes the wells are more than 100 feet

- deep. At present it is very unsafe to dig a well in this part of the country; quekrand intervenes and does act allow the construction to gu on any further and the ccustruction of many such wells has to be about the construction of many such wells has to be about the country works. Department to the Kaira dustrict have, however, constructed two or three nolls in which this has necoured. They have succeeded in digging such wells in these tractor, therefore I think such wells should be made by the Public Works Department from Impetal revenue.

  18. O. Sannass Gosconment were to make such wells and
- 18. Q. Suppose Government were to make such wells and the oultimater had to pay nothing for them; do you think he would use these wells for calitration?—In the case of deep wells enlivature would not use them. The cattle cannot wark them if they are more than 50 feet deep; pumps or some other means would have to he applied.
- 19. Q. After a well is made it is possible you might not find water?—Yes; last year, which was a famine year, i dag a well in my own fields and found no water; I therefore left the locality and wont 50 feet further and dag another ond there too I found no water. I speed Rs. 1,500 on those two wells and they are worthless. Quickand comes in the way and you can get ne water.
- 20 Q. It would be a good plan if some anthority—the Collector of the district—could make a boring ond say beforehood whether there is water ?—At the time I dug my wells Mr. Quin was the district Collector; he lent me a hering machine that no one knew bow to me it.
- 21. Q. Arey in farour of the extension of loake in the district?—There are sufficient tanks, but they should be deepened and repaired. All the fields are charged sub-soil water-rates and tonk ossessment has also here fired on the surrounding fields. I have mentioned in my note that these lara not been repaired for years. Every year the tanks are allting up more and the capacity for helding water is growing less.
- 22. Q. These are small tonks?—Yes. I om in favoar of hoving more wells, jast like these in Charetar. The people could use onch wells.
- could use oneh wells.

  23. Q. When the waler is not very deep?—Yes; the water is deep only for five or six miles on this side of the river; in other parte yea will find water only 40 or 45 feet deep. Therefare wells should be constructed where they are wanted and they should, I think, he constructed from Imperial rerence. One onns from the grass Imperial revease should be put aside in the Kaira district and placed avergular Irrigation Fund, and from this one onna, wells should he hall unanally where they are most wanted so that the nature of the land will be improved and Government will not be abliged to lessen the assessment.
- 24. Q. When the water is very deep you think that Gorernment abould male the wells ?- Yes.
- 25 Q. When the wa'er is not very deep, say, thurty or furty feet?—Then also Government should make them; if it is left to the cultivaters I am sure they will not make them. They will say "next yeer; now we are all right, why should we hald welle."
- 26. Q. Will they forget the lessons of the famine?— They had lessons 25, 60, and 100 years ego An soon as good times return they will furget the experiences of the famine.
- 27. Q. Yun refer in your memorandu.; to tanks?—I refer to small tanks under which rice fields are cultivated. Such tanks have been leaved to the people; they ares 'ting any and their capacity for helding water is decreasing. When the cultivator wants water for rice there is very little available though the loads under those tanks are charged water-rate.

Mr. Behechar• das.

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- 28. Q. Would you put those tanks under the District Buards or would you loave them as they are at present?—Under the District Boards.
- 29. Q. De you think they would be improved if they were placed under the District Boards?—Yes, ussessment is alresdy charged by the District Buards for repairing such tanks.
- 30. Q. De you think Government can repoir the tanks as cheaply as the people themselves ?—I do not think so, Government repairing will cost double the amount which the people would spend in repairing tanks.
- 31. Q. (Mr. Ibbelsen.)—You would have Gevernment make wells at its own expense where the water is at a ressonable depth?—Yes.
- 32. Q. What rute would the cultivator pay tu Gevernment ?-- Under Rs. 3 per nore, I suppose private owners are charging Rs. 2 an nore.
- 33. Q. You propose that Guvernment should forfeit half its advance if a well is made properly and theroughly ?-- Yes.
- 34. Q. You would have Government charge half the rate?—Nn charge should be made up to the time of the new revision of settlement.
- 35. Q. You say that when Government makes a well at its awn expense the outtivator should be charged a waterrate of Rs. 3, hut supposing Government univances meacy for making a well and remits half the advance, what should be pay?—I say that the water-rate chould be charged scenaricly.
- 36. Q. Would you say that half the rate should be charged when Government remits half the loan f-Yes.
- 37. Q. You think the cost of making a tank is twice us large if made by Gorernment as it would be if constructed by the cultivators?—Yes.
- 38. Q. Would it not cost twice as much if Government made a well?—Wolls require materiels, brioks, etc.; tanks require only digging and the cultivator supplies his uwn lobeur.
- 33. Q. Do you think the Public Works Department could make a well as cheaply as the people ?—I den't coppose so that the Public Works Department makes such wells much more pakka than the people would and therefore the cost is greater. No doubt private individuals could make a well a little less expensively but the work is not sound.
- 40. Q. (Mr. Rajaratna Mdlr.)—In the second case you prepase that Government should make a well and charge nothing ?—Yes, I refer to Inamdans' lands. Government can dig a well in the Inamdars' lands but cannot make n charge for the land in which the well is dug.
- 41. Q. Government would not dig u well and spend mency over it unless the Inaudar vanted Government in do so !—If on Inaudar wanted it, then the land on both sides of the well will get unt of cultivation and he should not be charged.
- 42. Q. Only so much of the land should be exempted ?-

- 43. Q. I thenght you propose that the whele of the land irrigated by the well should escape taxation?—Nu.
- 44. Q. That is not your mouning !- No.
- 45. Q. Supposing there are three acres at land under a well, do you maintain that Government sheald and unity spend money in making the well hat also allow the three acres to he irrigated free of chargs ?—Yes.
- 46. Q. Is not that a very large order upon Gereramont?

  —To extend irrigation covernment should dig wells of four mots so that 20 or 30 nores can be irrigated and the excess water can go to the adjacent fields.
- 47. Q. Why should the Insudar get free irrigation?— Because ground has been brought under the construction of the well and is used by the well; and he will be deprired of the collowation of the crop.
- 48. Q. Therefore the State should exempt him from essessment?—The Inamdur has not to pay any assessment.
- 40. Q. De yeu advocate the reduction of the rate of interest on loans granted by Government?—Yes, tu eacourage the cultivator.
- 50. Q. Would you in that case remit half the ndvance P—Yes, that would induce the people to make more wells—mere complete wells and ne kacheha and unlinished wells.
- 51. Q. (Mr. Muir-Mackensie.)—You think they would not do it unless they got that inducement ?—Yes,
- 52. Q. (The President.)—Would it not also be sufficient inducement for garden cultivation ?—Yes, but gardon crops cometimes fail in the cold weather; in nuc sensen they failed nu account of the insects. Cultivators are not sure of getting a proper return averywhere; but it will induce people to make wells in times of drought and when rain is insafficient for watering the oreps.
- 53. Q. (Mr. Muir-Mackenzic.)—Supposing Gererament made wolls, sarreying the site and paying the cest and charging only the annual bagayat essessment. Do you think that would be an encouragement to the people to make wells?—Yes; but some of the rayats relations may die or there may be a marriage in his family, he may not take the hencit of the water; in that case he will have to pay the Gererament assessment all the same.
- 54. Q. Suppose Government remitted, half, would that be no inducement?—Yes. If they have to pay assessment on wells they will not make them.
- 55. Q. Ie your village de you know of wells made on terms something like those I have described?—Yes, there are many wells there of which Government paid the whole cost. The cultivator makes the well und Government obarge. Lagayat assessment.
- 50. Q. Gerernment does not luke cash assessment?—No. It only charges the matricator for the gross produce in the field. The ground is divided according to certain rules. The charge is. 12, Is. 8 and is. 5 per acre. Government can increase the rates every three years occording to the fertility at the seil.

WITNESS No. 10 .- Mr. P. R. CADELL, I C.J., Acting Collector, Panch Mahals.

Answers to printed questions.

Mr. P. R. Cadell. 2 Dec. 01.

1

- The answers below refer to the Panch Mahals district.
   I have tonred throughout it. The district is divided into
   two portions, distinct from each other in climate, soil, and
   population to a degree which differentiates their requirements considerably.
  - 2. The average rainfall per measem is as follows:-

		Eastern. Inches.	Western. Inches.
June .		. 4.33	ō·22
July .		. 9.82	15.32
Angust	•	. 7.59	8.79
September		4.64	7:33
Oataban		1:04	1.00

3. There are serious obstacles to the spread of irrigation, which are briefly as follows.

Western Division.—The principal objection is the character of the people. The mass of the cultivators are Kolis, extremely lazy and thriftless. The Kundis are good and skilful cultivators, but they constitute under 4 per cent. of the population; and the Rujputs and Malis, who are fair cultivators, are not more numerous. These

olusses toko readily to well-cultivation, and this is the onlyform in which any extension of irrigation is possible. The country is too much of a dead level to allow of irrigation tanks commanding large areas; and, though it would be possible to make large storage works in the hills to the north, the cost of any system of irrigation therefrom would be onermous.

Irrigation is not generally desired by the people because the mintall is nearly always sufficient. There has never heen sente went in this division hefore the recent famine. Only, therefore, the superior cultivature desire irrigation to mise the richer crops.

The greater part of the soil is light goradu, containing much wern lime and granite, and rich wherever at all desp.

Eastern Division.—The character of the population, here, is again the chief obstacle.

The great mass of the population are Bhils, who, though not quite so buy as the Kolls, are even mere backward and thrifties. While the Kuli indulges in opium, the Bhil spends all his spars cash in liquor. He raises in ordinary yeers both a kharif (maize) and a rabi (wheat or gram) erap on the same piece of ground and has sufficient for his

wants. Although failure either of the early or late rain is not uncommon, he is almost sore to get one crep and his assessment is extramely low. Water is ordinarily ptentiful in a country of anter-courses and steep hills. The tanks, however, naturally he in deep holtows, and this fact, with the absence of ony stretch of level ground, would render irrigation from them difficult. It would be easy country to make large storage touchs by hunding up streams, and one is now being constructed.

The lack of capital is quite a minor objection ond, as wells only could be constructed by private means, and he removed by takari grants. The power cultirators require protection, but this has been provided by the restricted tenure.

- 4. No works except wells are constructed by private capitol, and cubanced assessment is not lavied on those.
- 4. No works except wells are constructed by private capitol, and enhanced assessment is not lavied on those.

  5. Loans under the Land Improrement Act were not freely taken up before the scarcity, eimply through the ignoremee of the people about the system and because the sower disansed them from taking Government assistance. The system has now been thoroughly popularised be the gravits during the formine, and the sower's influence has been much weakened. Government assistance will now be readily taken and will be at first necessary for those who has a adopted the restricted tenore. I do not think that any reduction in the ordinary rate of interest is advisable. The nurgin between it (at 6 or 6 per cent.) and the interest on Government paper at 3½ per cent. is not sofficient to nilow of a special ladocement a grant might be made of sums to be taken up, say, within five years, free of interest—in fact a special offer. I do not think ony remission or grant-inadi need to made, except to encourage backward classes who have accepted the restricted tenure, to make wells. Unless they have accepted this tenure any soch remission would be a gift to the sower. I think, as stred below, that boring instruments and blasting powder should be sopphed free; and on necount of the special difficulties of the district, I think, the Collector ought to be empowered to remit in case of failore to find water.

  6. On the routrary, what we want is to obtain cultivators for irrigated tracts, and a colony of Kunble on Medille.
- 6. On the contrary, what we want is to obtain cultivators for irrigated tracts, and a colony of Kunbis or Malls could be uccommedated in occural places.
- 7. There are no canals in this district. It is proposed to make one from the Mondia tank now under construction.
- 23. There is only one irrigation tank in the district, the Malar tank, and the area front it is only 173 acres. The arrange account is from Rs. 8 to Rs. 10 per ocre, and two cups are taken. The best rice (fakhwel) is grown, while the ordinary rice in the di-tilet is of the course kind. The stressment is laried on the whole Irrigable orca.

There is also a small amount of cultivation by lift from village tanks, but this cannot of course be any assistance in nyear of severe drought.

There is room in the Western Division for some extension

of tank-irrigation but not very much for the reosons before

31. (1) The average depth of palka wells is from 15 to 30 feet throughout the district. The rantation is caused by the presence of rock everywhere and the chance whether a spring is found quickly or not.

- (2) The supply is from springs, except in the case of wells erected cose by tinks, where it is by percolation. The wells erected cose by tinks, where it is by percolation. The wells very uncly become saline, but the spring of water is sometimes feebla. The spring woold not be affected by one year of drought; but wells getting water by percolation naturally suffer in dry year.
- (3) The cost of construction is from Rs. 300 to Bs 700, spending on the number of mets or lifts.
- (4) The duration is for about 20 years, when the masoury
- (5) The water is lifted by mote or Los,
- (6) and (7). From 15 to 20 acres are commanded by one ell and would all be irrigated except in years of heavy
- 35. (1) Two crops are taken, succept of course in the case of sogurane. Rice sod what would be the normal crop, the former being watered from the well only in its later stage. Vegetables are very generally raised.
- (2) Sogareace is grown nod also the superior kind of
- rice.
  (S) In a year of ample raiofull the first crop woold not be watered at all from the well; in other years it would of course be assisted.
  - 36. I am trying to get figores on this point.
- 37. Rottings me generally small and calitrated by their owners. In the Western Invision enhanced rent on account of a well amounts in Rs. 20 or Rs. 30 per nere. In the Eastern, permanent wells are not known to have been rented. Only Rs. 3 or Rs. 3 cohsneed rent is charged for a kacheha well.

No enhanced ravonce is charged by Government on oc-

- count of a well.

  38 Serious difficulties occur in selecting the site of a well.
  The depth at which springs are found varies greatly, and
  when found, the spring is liable to run dry. Several of the
  Local Fond wells, though constructed solely for dricking
  purposes and therefore in low-lying spote, are quite dry.
  There are diviners who are believed in hy score. They may
  have some eye for country, but their principal guido secus
  to be the smell of the earth and they are generally franches.
  I do not know what expert advice could be offered, but I
  thiak assistance should always be given by the free loan
  of boring tools and the free grant of blasting powder.

  In the Western Division, where there is black ned me-
- Io the Western Division, where there is black nod me-dinm sail, wells are difficult to construct; but this is not the case, apart from the necessity for blasting, in the Eastern Division, where even kacheha wells stand well.
- Division, where even kacheau wells stand well.

  29. I do not think Government should construct wells in private lands. The better outlivators will do it better for themselve, while beckward ones woold not use the wells properly and would thus find it difficult to pay the necessarily enhanced assessment. It is better to osist the more intelligent of the backward classes who want to help themselves.
- 40. Kachcha wells are unknown in the Western and me common in the Eastern Division They are generally shollow, irrigating from 1 to 3 ners antr. and are coosequently nedess in years of drought. If deepsared, however, they would from some assistance, nod their despening can be made n form of easieted village famine labour. Their extension should, therefore, be encouraged among the back-
- 1. Q. (The President.)-Ton one Acting Collector of the Punch Mahala :- Yes.
  - 2. Q. Ifow long have you been there !- Since April last.
- 3. Q. You know Gujarat well !- Yes.
- 4. Q. You were in Gujarat throughout the last famine? -In early part of the famine I was in Broach.
- 5. Q. Yoor district is one which has very seldom suffered from famine f-Very seldem. The only record of severa famine that I can point to be that of 1790. The eastern part is liable periodically to slight secrety.
- 6. Q. Ifow did you get an in 1877 :- Relief works were opened, but there was very little distress.
- 7. Q. What is the area of your district ?—About 1,595 square miles.
- 8. Q. What is the population:-The population is 265,020.

- 9. Q. Du you know what the loss was doring the last famines.—The reasos shawed a decrease of ubout 16 per
- cent in 10 years.

  10. Q Of the 1,595 square miles there must be large tracts of waste land?—About 60 per cent of the ures is culturable.
- 11. Q. Is there souch distress there now?-There will be more distress this year than last year, but not so severe as in the first year of the famine.
- 12. Q. What do you think would be the best form of pro-tection arminst a future fusion !—It is impossible to sefe-gand the country against famine by irrigation, but it is persible to increase the number of wells to n very limited extent.
- 13. Q. Why is it impossible to protect the country by irrigation?—Because the population is very backward, they would not take advantage of means for irrigating then
- 14. Q. Are they Bhils !- Yes and Kolls.

Mr. P. R. Cadell.

- 15. Q. De they form the helk of your population?—Yes; they compose nearly 90 per cent. of the cultivating
- 16. Q. If they had irrigation works would they not take advantage of them?—They would not.
- 17. Q. Would they if the water were given to them for nothing?—Ne, I do not think so because in ordinery years they get plenty of rain and get a very good yield.
- 18. Q. The scare of the last famine will not change their habits in that respect?—I do not think so, not permonently. It had a tomporary effect on the Bhils who came on the relief works; but at first they would not even. come on the works.
- 19. Q. You say the greater part of the soil is goradu?-Yes; it is light-coloured and highly mixed with gravel.
- 20. Q. Is it fertile?-Very.
- 21. Q. What was the form of relief works?—Principally tank excavotion and enlargement of village tanks.
- 22. Q. (Mr. Ibbetson.)—Existing tanks?—Yes; they ore mainly for drinking purposes, and not for irrigation.
- 23. Q. (The President.)—Io there my demand for wells?

  No, except mmong the better coltivating classes who are only a small minerity.
- 24. Q. The Bhils do not make wells?—Some of them build kochcha wells.
- 25. Q. Among the better class is there my desire for the extension of wells?—Yes; I think the number of wells will increase fairly largely.
- 26. Q. Do they take fakuri advances?—Yes; during the famine they were given large advances, I know they would be willing to take them now. Before the finning they did not know of the system.
- 27. Q. (Mr. Ibletson.)—What was the proportion of the whole oultivating class of the people who took advances ?—Not more than 10 per cent. of the total sultivating cluse. Their holdings were large.
- 28. Q. (The President.)—You say that a well of two or three mots would irrigate 15 neres in an ordinary year? That is a large area?—That would be a well of 2 or 3 mets, 40 to 50 feet deep.
- 29. Q. Would it not be likely to run dry ?-Not in a year of good roinfall.
- 30. Q. Is there any tank irrigation at all ?- There is only one tank.
- 31. Q. I suppose that only irrigotes rice?-Yes, and a small amount of sugaroane.
  - 32. Q. You have a programme of relief works?-Yes.
- 33. Q.—Chiefly for the repairs of village tanks?—Yes, almost entirely. There is one large work at Mowelia going on now and another is proposed.
  - 34. Q. Is that a large tank ?-Yes.
- 35. Q. What is the ecope of the work ?-It will irrigate 5,000 acres.
  - 36. Q. Is the work well forward ?-Yes.
- 37. Q. Was it commenced in the lest famine?—Yes; three and a half lakks have been epent on it already.
  - 38. Q. Whot is it called ?-The Mowalia tank.
- 39. Q. How many people coold you employ on that work if occasion erose?—Up to 10,000; about 3,000 are now employed on it; the canal will have to be six miles leog. The line runs np to Neemnch.
- 40. Q. I suppose the less of cattle was severe during the lest famine?—Very large; we gave Rs. 20,000 for cattle in tokavi last yeer; the people had to bring cattle from the hreeding grounds.
  - 41. Q. Whore are the breeding grounds ?- In Malwa.
- 42. Q. Did the Bhils suffer in respect to their outtle ?-Yee; they enffered severely.
- 43. Q. Are they a wandering tribe?-No; they live in hute, scattered.
- 44. Q. (Mr. Higham.)—What is the culturable area in the Panch Mahele?—About 663,000 nores.
- 45. Q. Is there tonk and well cultivation in the district? There is no tank cultivation; there is only cultivation from wells and that is not more than two per cent.
- 46. Q. Did the wells work well during the famine of \$99?—Most of the wells worked protty well; a few

- 47. Q. I suppose the wells which were made in 1899 dried in the following year? This year they are nearly old dry; this has been a very bod year for wells.
- 48. Q. What happened in the first famine year P-Most of the welle held water.
- 49. Q. I suppose the nrea Irrigated by them was not sufficient to motorially benefit the district?—I do not think it made my difference. The lands irrigated by these wells belonged almost onlinely to the better class of cultivators, and they were not in very great distress throughout the war. the year.
- 50. Q. They did not come on relief works?—No, not the hetter class of cultivators. It did not make any difference to them.
- 51. Q. Did they give employment?—There was no great demand for lebour on the site of their holdings.
- 52. Q. Was the Mowalia commenced in this famine?
- 58. Q. It is not an old tank !- No; the work ie not yet completed.
- 54. Q. When will it be completed?—It will be completed in April if the number of labourers employed on it is 5,000.
- 55. Q. Are sluices being constructed !- They have not heen coostructed yet.
- 56. Q. Has mocey been provided for making thom ?-1 believe so; it is in charge of Public Works Department.
  - 57. Q. The Mulac tank is an old tank ?-Yes.
  - 58. Q. How long age was it huilt ?-Mony years ago.
  - 59. Q. Is it a large one?-It irrigates about 130 acres.
- 60. Q. Is the water in the tank taken every year?-Yes, every year.
- 61. Q. Do they pay weter rate?-Yes.
- 62. Q. Have you a fairly steady demand for water all se vear round?—I am ufmid I cannot say; the Assistant Engineer will be oble to tell you.
- 63. Q. (Mr. Muir-Mackenzie.)—All the cultivators under that tank are Kunbis?—Yos; Kunbis and Molie.
- 64. Q. (Mr. Higham.)—In the relief programme do you enter kachcha wells?—Not in the programme; but grants are heing made for making kachcha wells by fomine relief labour.
- 65. Q. The grant covers the whole cost ?—Yes. A grant of Rs. 50 is made to the Patel of the village, and ha is respoosible for its expenditure.
- 66. Q. Is that amount recovered, ie it troated as an advance?—No. The well is for drinking purposes and not for irrigation.
- 67. Q. Are the wells made specially for dricking purposes only ?—No, the same wells osn he used for irrigation; but they are not called famine works.
- 68. Q. Ie there any objection to calling them famice velief works ?-No, none
- 69. Q. If a man wante to make a kachcha well can he get an advance ?-Yee ; he gets takavi.
  - 70. Q. Hew much ?-From Re. 50 t. Ra. 100.
- 71. Q. The grouts are made to the Patel and he copervises the work?—Yes and he sees that the work is carried out.
- 72. Q. He poys for the lobour hy piece or so mech a head?—He pays so much a head and is heard to employ so many people; he is also bound to keep a rough regleter showing how many people he employed and how much he
- 73. Q. The Public Works Department have nothing to do with it?—No; nothing.
- 74. Q. Con you tell us anything about the expenditure on account of relief works in the Punch hahledaring the last famine?—The figures which I have show that Rs. 4,64,000 hove been spent.
  - 75. Q. These figures ioclude the Mownlin tonk !- Yes.
  - 76. Q. Were other tanks taken in hand ?-- Yee.
- 77. Q. Are they being completed?—Yes; Rs. 1,20,000 have been spent on village touks, i.e., villego works done by

Civil Agency and Rs. 3,40,000 on works done by Public Works Department Agency.

78. Q. The village tanks are ande by Civil Agency ?-

79. Q. Do they hold water ?-They held no water this year, because there was no rainfull.

80. Q. (Mr. Ibbetson.) -- You say that a hig tank is being made now ?-Yes.

81. Q. And that there is a proposal for another ?- Yes.

82. Q. Will the lands they irrigate he held by the hetter class of population?—Yes; the tank near Goonn is in the hands of the better class of the population.

83. Q And the other ?-We have not selected n site for the proposed tank.

64. Q. You think the Bhils would not take advantage of 163. (2. 10a mink the amount of the post in the post of the water free?—They have no experience of trigation, and thay do not want it because with ordinary rainfall they can get two crops from their lands by simply scratching them. In ordinary years I doubt whether they will take to irrigation.

BJ. Q. It comes practically to this, that it is a hopeless ask to try and protect this population?—I think it could be a hopeless task to try and protect them by irriga-

80. Q. As regards the better class you suggest that me o special inducement loans should be made for five years free of interest, you expect only the better class of entire to take taken for wells?—Yes.

S7. Q. Supposing you tried that experiment, do you think a large number of wells would be made?—I think the number of wello in the district will be doubled.

89. Q. What would be the cost of n big well P-From Re, 360 to Re, 700; a good well could be made for from Re, 500 to Re, 700.

89. Q. What area would such a well irrigate P-A well of two or three les would irrigate from fifteen to twenty.

90 Q. What water rote should Government charge ?-overnment al oold charge nothing it the well is made from takaci advances?

21. Q. Government would lose interest and get no recept that it is carried out as n protective measure ?

22. Q. Are there a large number of wells in your district that are not used in ordinory years?—In a year of good rainfall name are not used at all.

93. Q. Have many fullen lato disuse? - No; I do not think so. Twoy do not got brackish in this district.

91. Q. Yon don't think that these wells on which Gar-ernment sacrifices its money fall into disrepair for not being used?—I do not think so, they would be used every second

95. Q. I see that in the Malao tank you charge Rs. 10 no acre for irrigation f.—That includes land assessment.

96. Q. That is a consolidated charge and not merely a sufer-rate?—No.

97. Q. Do you get all your water need at that rate ?-I could not say.

ps. Q. What crops are raised?—There are two crops mised, the ordinary crop would be rice, followed by wheat

29. Q. In the same ground?-Yes.

100. Q. In newo like that, would a man put the whole of his holding ander rice ?—Yes; I believe so.

101. Q. And wheat or gram to follow?-Yes.

102. Q. Is it manared?—Ricecrop is not mach manared, except in the med beds.

103. Q. Whot does a well that has three more co-t?-

101. Q. The rate per acre irrigated by each a well would be from Re. 5 to Re. 7 f-Yer.

105. Q. You speak of boring tooks. Do you mean drills for trial barings:—Yes; they are being tried, but I have an experience of them.

105. Q. flave you but large experience of the takuri system in Dombay :-- Yes, in various districts.

107. Q. Do you think that the 5 per cent, that is charged a advances is any obstacle?—No, I think it is extremely

108. Q. When do rea begin to recover takori; how long after the lean is given?—Generally with the first load revisive collection, in the next year.

109. Q. A well would not be in full working order by Mr. P. that time, the work will not be complete?—I think it would. Castett.

110. Q. You mean to say that it would be completed between the time you give your loan, and the first revenue collection?—The man would not have to pay the first instalment till the next year.

111. Q. Could be make a mesonry well in that time, fit it out and get the erea fully irrigated?—I emaet eny.

112. Q. (Mr. Muir-Mackenzie.)—Is there not n provision in the roles allowing that the first instalment should be postpoaced till the well as brought into working order ?— I am not sare.

113. Q. (Mr. Ibbetson.)—How long do you take to re-over the tatout for wellar—The Collector fixes just linearity

114. Q. Is that the limit nader your rules?-Yes.

115. Q. It cannot be under ten years !- I do not know of ony case

116. Q. Ordinarily you get the whole of the advance back in ten years? - Ordinarily in eight years.

117. Q. I see many people recommend smoll instalments which would make the period of recovery much loager; do you think ten years too short?—I do not think ten instalments acts barshly apon the people.

118. Q. What is the scencity in the case of a takari mat-The man's land.

119. Q. The land to be irrigated?-Yes.

120. Q. You don't demand colluteral scenity ?-No.

121. Q. Scenrity on any other land ?-No.

122. Q. Is the bond registered by which he pledges his had?-No.

123. Q. Sappose, owing to a had year, a mnn meets with failure do you saspend the iastulmento—do you obow him uny lenieacy?—No.

121. Q. Sapposing he does not find water or that he strikes brackish water, is there any provision for romission? -No, act at present.

125. Q. Do you think that such a provision would lead to noort of gamble with Government money. Might not a man say, "If I don't find water Government pays, I don't wish to take acy risk?"—It woold make him more willing to take the risk. I do not think it would be gambling with Government money.

120. Q. On sites which have been approved by Government after trial borings if a well does not succeed, you would remit three-fourths or the whole of the edvance?— I think Government should hear the whole loss.

127. Q. We have been told that people me dolorred from making irrigation works by the fear that they will be arrested enhanced rates; is that year experience?—I bare never heard of it.

128. Q. Do you think the prospect of enhanced assessment enters into their calculations?—I think they are not quite certain of getting their lands which me with the conear or the Maxwell.

129. Q. Do you think that detors them ?-Yeo

130. Q. What is there to diminish their confidence?— The restricted tenore I thluk.

131. Q. Have you any oxperience of Local Board management?-No; I have not.

132. Q. Do you think Local Boards should look after small scattered tanks and that the larger works should be undertaken by the Public Works Department ?—I do not

133. Q. If n new work is made by a private individual Government will not charge on it; and if it is made by the Local Board it would seem only fair that they should get the income?—Yes.

131 Q. Supposing they had an income of that sort rendered available by Government relinquishing to them the revenue; do you think any scheme of that kind would succeed!—I think it is quite impracticable.

succeed?—I think it is galle impracticable.

135. Q. I mm speaking of n else in which Government la not prepared to get the work done by the Public Works Department; the works being too small. Do you think that the Local Bourds would push on the works it Government provided the means. Bo you think there is any hope of their doing so?—I do not think so.

136. Q. You don't think there is much hope in that direction?—No; I think there is not The Local Board is practically under the management of the Collector and the Momintum.

2 Dec Ot.

Mr. P. R. Cadell.

- 137. Q. (Mr. Rajaratna Midr.).—Yon say there are several rivers in the Princh Mahals. Why not utilize them?—They cannot be utilized. Several rivers go through the district.
- 138. Q. There are three rivers in the Western Mahals?—Yes.
- 189. Q. Could none of these rivers be utilized by any means P-I do not think so-
- 140. Q. Kacheha tanks are recommended in your printed note; have you any idea whether they would be of any use in the Panch Mahals?—Yes; one very good tank has already been made this year; they are recommended because they would raise the water-level and be beneficiat in various ways. I think tanks, to a limited extent, ought to be made in the eastern part of the Panch Mahals.
- 141. Q. Considering the characteristics of the people and the fact that your dry crops may well, what would you recommend as the best means of profection against famine. Should kackeka wells be encouraged?—I do not think there would be may effectual protection by them; they are only shallow wells.
- 142. Q. They would serve no purpose in a year of drought?—For one year of drought they would.
- 143. Q. Would people take to the construction of these wells if fecilities were given in the shape of granting leans through the medium of specially appointed officers?—We would have to be very quick about it; it is very difficulty to know whother there will be a drought in the first year of scarcity.
- 141. Q. If you appoint a number of special officers, one for each taluka, could you not prevent famine?—You might.
- might.
  145. Q. What area would a kachcha well irrigate?-A kachcha well will not irrigate more than one to two nercs.
- 146. Q. Won'd that be useful ?-Yes; but you have to be very quick about building it.
- 147. Q. Suppose a patta is given to the rayat guaranteeing present exemption from entineement, and guaranteeing also that at the next Revision Settlement the land though liable to some onlumement on general considerations, based on rise in prices, etc., would not be liable to be onhanced on account of improvoments made by him; would this stimulate the extension of rells?—Yes.
- the extension of wells?—Yes.

  148. Q. Suppose you grant him a permanent patta exempting him from all future enhancement?—That would be a very undesirable principle; it would be putting Govornment to a less to a certain extent.
- 149. Q. It has been recommended by the Famine Commission. Would that induce the people to extend the construction of wells?—I do not think so; there are using rayuts sufficiently provident; it may have some effect, but I don't think it will have much offect. Any such measure is very undesirable in the Panch Malinis, as the assessment there is extremely low.
- 150. Q. In para. 6 of your printed note you refer to colonization. Would it be possible to arrange such colonization in the Panel: Mahals?—In this district Kolis are numerous, and it is very hard to get them to co-operate. We have tried them, but they say it would interfere with their nyat and marriage arrangements; it is very difficult to seems their co-operation.
- 151. Q. (Mr. Muir-Mackenzie.)—What crops are the tanks expected to irrigato—rice?—Yes; and cold weather crops.

- 152. Q. You do not think that the Bhils and Kolis would be induced to take water from the tanks for rice?—They don't want rice, they grow maize to cat and whent and gram to sell. Rice cultivation means more labour and bottor bullocks.
- 163. Q. What class of work would you recommend in the Panoli Malials as famine relief?—I think there is nothing to do, but to arrange for village tanks.
  - 164. Q. Would that soffice P-Yes.
- 165. Q. Don't you think it would be n good thing—just as n metter of experiment—to make some irrigation tanks !

  —That experiment is being made in the Mowalia tank.

  Another tank will also be made.
- 156. Q. On the Mowalia you have Kuubis to cultivate?

  Yes, the land is held by Kuubis.
- 157. Q. Are a great part of the Bhils lands held by Sowears P-No; not much.
- 158. Q. You do not think that the prospects of irrigation would be nifooted by the sowenes P—The sowears would take the lands and gradually these lands would pass out of the cultivators' hands.
- 159. Q. Do you think the sewears would be tempted to bring in good cultivators from antside P-I do not think so; I have not heard of their doing so yet.
- 160. Q. Are there many disured tanks in the Panch Mahals—old ones and unrepaired ones ?—I do not think so.
- 161. Q. Are there any disosed wells in the forests ?—Yes; in one part—Champaner. There the land in the forest is out of cultivation.
- 162. Q. You say that village finks are useful for finding work; would it be equally useful to make long bunds ?—I think they would be just as aseful as village tanks; because village tanks are used for drinking water, and storage tanks could be used for drinking purposes.
- 163. Q. I mean long bunds like those you have in Anand and Vitumganan to hold up surface water for wheat and irrigate rice below?—That would only be possible in the Western Mahals, where the country is level.
- 161. Q. Within that country they might be used?—Yes; I think they might be used.
- 165. Q. Have you may suggestions to make no regards providing greater facilities for taking takani advances?—I think they should be given with greater expedition than at present.
- 166. Q. That would require the maintenance of a considerably larger establishment than exists?—No; one or two more Karkuns from the kacheri of each talaka.
- 167. Q. Could not the Circle Inspectors distribute takari?
  —They don't give takari at all, they simply inspect works.
- 163. Q. They make inquiries us to the scenity of the man?—No; not the Famine Circle Inspectors. That is done by the ordinary Circle Inspector.
- 169. Q. They lave done it in most cases since the famine came on ?-Famine Circle Inspectors did.
- 170. Q. At any rate do you think they would be usefully employed in making these inquiries, or do you think that the work should be left to other officers?—I think it would be better for the Karkun to report direct to the Mamlatdar.
- 171. Q. Havo you seen water-logging in the Pauch Mahals?—Never.

Mr. K. G. Desai. WITKESS No. 11 .- Mr. K. G. DESAI, Executive Engineer, Kairs and Panch Mahals.

Answers to printed questions.

2 Dec. 01.

GUJARAT.

Paragraph 2.

- (a) Proportion of land protected by irrigation works.
- (b) Character of soil.

KAIRA AND PANON MAHALS.

Nil.

Kaira District.

Mostly sandy from decomposed gueiss, sand stone, quartzite, slate, &c. In parts of Minn and Thasra, there is a little black soil from decomposed trap. The sandy soil is very porons and allows water to seak in quickly. It is, however, very fertile.

Panch Mahals.

The soil is similar; parts of Kalel and Halel have black soil from decomposed trap, the great Panaghad hill being trap.

Koira District.

(c) To what extent is cultivation dependent on artificial irrigation?

(d) Rsinfall.

(e) Is there ordinarily n demand for water in Gujarat during south-west monsoon?

(f) What are the crops which require irrigation?

#### Paragraph 3.

- (a) Do small tanks constructed in black soil hold water ?
- (b) Can high earthen dome be made of black soil without macoury core walls?
- (c) When the land irrigated is black soil, is there any demand for water during seasons of average rainfall or only in case of prolonged drought?

Paragraphs 4 and 5.

4 (a) Any other possible sources of irrigation?

Paragroph 6.

(a) By whom were village works constructed and con-

(b) Is any irrigation tovenne realized?

(c) Value of such works as concerning village watersupplies for men and cittle without reference to irrigation. Paragraph 7.

Paragraph S

(a) Tracts in which lands or crops are injured by mater-logging or excess of water in very wet years.

Inrag.aph 0.

Paragraph 10.

(a) Districts for which programmes have and have not

been prepared.

(5) Examination of programmes, etc.

(c) Arrangements for maintaining or completing programpies.

In north Matin and part of Mehmudahad Taluka, rice crops are assisted by water derived from the Khuri river. The works are in charge of the Executive Engineer, Ahmadahad.

Panch Mahals.

Some of the village tanks and that at Mainr supply water for rice crops, but there is no systematic irrigation.

The Agricultural Department will give the statistics. It was not supposed to have failed any time before either in Kuira or the Pauch Maisis for a century, but in 1809 monsoon, there was only about 7 inches and even grass did not graw. 1900 and 1901 have also been bad monsoons.

Rico fields near tanks take a little water when the late rains are insufficient in both the districts.

Rice crops.

No, mixed constructions are also not believed to be sound, and thus where proper material for earther hunds is not obtainable, masoney down are the only alternative.

Usually no demand. If large canals are constructed, demand would be created for rubi and sugarcanc, etc., particularly in the Knira District in which the soil is very rich. In the Punch Muhhls, the cultivators are Bhils and there will probably be no demand.

The Executive Engineer, Ahmadabad, can give luforma-on for Kaira. There is no irrigation work in the Panch tion for Mahals.

For Kaira, the project of making a cauni from the Mahi is under the consideration of the Seperintending Engineer on special daty and he will give further details. Panch Mahis. If expense is no consideration, sites for large tanks may be found, but they will not pay even working expenses in ordinary yours.

They were constructed in former days by the village community. Latterly the District Board has been spending money for improving water-supply tanks. Government in the Public Works Department have spent no money in the Knirn District. One tank, viz., tank at Alelax, was repaired at a cost of R2,865 in the Panch Mahhis from Imperial Irrigation. The sam of R55,170 was also spent on it in 1899-1900 and 1900-1901, as famine work for clearing silt from Famine funds.

The sum of R898 is realized as irrigation resenae in Kaira District from the Chanvaya Tank and R1,529 in the Punch Mahals from the tank at Malav.

They are useful for water-supply, ele.

The Collector can answer the question. There is no probability of artesian wells being successful in the Kuira District.

In the Paneli Mahala a very enreful examination of the geological structure will be assessary as there is a great variety of strata in the different talakhas. None of the out-crops seen by me are, however, of persua materials.

The south-west corner of the Knira District, that is, parts of Borsad, Anaud and Mhar, suffered from being water-logged in former years. This was partly remedied by the construction of the Anand-Mogri drain and lately by the Karamsad drain, and two drains in the Matar Talaka, the arts of water-logged lead is up per two statements attached, but no remissions are known to have been made. No part of the Panch Malabis is water-logged.

The statement of classification and expenditure of famine works for Kuiro and l'unch Maháls is herewith sent. See note to the statement for their usefulness, etc.

Famine programmes have been prepared both for Kaira and Panch Mahals.

Copies will be shown personally.

There is no special arrangement. The usual district establishment is required to prepare them and maintain them.

It would be better if special establishment la each district be appointed for the purpose.

Mr. K G. Dezas. 2 Dec 01. Mr. K. G. Desai. Statement showing water-logged area relieved by the construction of the Karamsad drain.

Desai. 2 Dec. 01.

Táluka. Name of villogo.					Táluka. Name of villogo.							Area.		Assessment				
Nadiád "	•	•	•	•	Chakalesi Kanjari Narsanda Wudtal	•	:	:	:	:	:	:	•	:	•		g. 24 17 21 10	# a. p. 1,273 14 0 787 13 0 1,303 8 0 247 0 0 3,612 3 0

# Statement of land subject to floods in Matar Táluka.

Name of Channel and the villages it would relieve.	Area of land which can rei	subject to flooding se a fiabl crop only.	spionii on	l which has been t of entitivation ecount of submergence.	Total area which enflors from want of outlet to flood waters.			
	Area.	Asse-sment.	Area. Assessment,		Arca.	Assetsment.		
let Täräpur Channel.	A. g.	R a. p.	A. g.	R a, p,	A. g.	R a, p.		
Jichaka	828 31	1,170 8 0	32 17	86 0 0	361 8	1,265 8. 0		
2nd Singiwara Channel.								
Singiwara	59 28 121 3	299 10 0 265 0 0	,,,	***	59 28 124 8	290 10 0 265 0 0		
	183 31	564 IO O		•••	183 31	564 10 0		
3rd Dettaly Channel.								
Bhalada	111 11 68 29	599 12 0 426 8 0	30 22 4 32	158 0 0 8 0 0	141 38 73 21	767 12 0 434 8 U		
	180 Q	1,026 4 0	35 14	166 0 0	215 14	1,192 4 0		
4th Lawal Channel.								
Lawal Tranja Maraia Nagrama Ashalaly Nandoly Khandaly Kathoda Punaj	550 9 81 26 184 27 35 38	547 15 9 3,937 4 0 373 8 0 910 0 0 249 4 0 306 8 0 1,185 0 0 1,185 4 0 1,026 11 6	27 18 72 36  36 1 8 27  24 35	185 5 2 432 4 0 85 0 0 61 0 0	120 7 623 6 81 26 220 28 44 26 74 37 116 36 233 14 194 7	723 4 0 3,569 8 0 373 8 0 1,007 0 0 804 4 0 366 8 0 708 0 0 1,185 4 0 1,138 0 9		
	1,538 28	8,312 7 3	169 37	862 14 5	1,708 25	0,175 5 8		
5th Herany Channel.								
Heranj	F # 96	2,241 4 0 362 4 0 4:1 2 10 12 8 0 208 4 0	60 1 18 18 17 16	355 0 0 872 13 10 129 8 0	448 17 56 21 201 11 18 38 24 21	2,596 4 0 362 4 0 1,344 0 8 142 0 0 205 4 0		
	544 37	3.295 6 10	207 34	1,357 5 10	# 752 31	4,652 12 8		
6th Undkela Channel.								
Undheia	862 32 42 26 493 24	591 0 1 292 0 0 2,856 0 0	64 36 170 3	411 13 11 567 0 0	151 19 42 26 663 27	1,002 14 0 292 0 0 3,453 0 0		
	622 33	3,719 0 1	234 39	978 13 11	857 32	4,697 14 0		
7th Radhawanoz Channel.		J						
Radhawaraj	29 4	246 0 0			29 4	246 0 0		
	3,428 4	18,343 4 2	680 21	3,451 2 2	4,108 25	21,794 6 4		

Statement showing expenditure on Works on which relief labour was employed in Kaira and Panch Maháls Districts. Mr. K. G. Desai. 2 Dec 01.

		Extendities.							
Item No.	Katres of Works.	From com- minerment to end of March 1910.	Frem April 1900 to March 1901.	From April 1991 to Beptember 1991.	Total.	BIWARES,			
•	PANCH MAHĀLS DISTRICT.	R	R	R	* R				
	. ROADS.								
	OBIGINAL WOBES.				1	1			
	Road Metolling.								
1	Metalling the road from Godbra to Santh	28,006	20,070	•••	49,186				
2	B. P. Metalling the road from Kalol-Halol road	4,435	6,301	,	10,739				
	Constant tion of Bonds								
3	Construction of Roads.	64879	0.150		20.400				
4	Constructing the read from Dobad to Limdi Constructing the read from Halel towards	64,273 20,658	9,159 610	***	73,132	}			
5	Jambughoda B. P.				31,268				
0	Constructing the road from Dohad-Aliraj- pur road.	30,319	68,679	***	08,008				
	Repaire.				]				
6	1		10,884		10,984				
ď	Collecting 10 years' supply of metal at the quarries for repairs to Godhra-Shehra road.	***	10,004	P#1	10,964				
7	Collecting 10 years' supply of metal at the quarries for repairs to Limkheda-Ihalod road, Local portion.	***	32,658	***	32,688				
	Tanks,		:			ļ			
	Miscellaneous Public Works Improve- ments.								
8 9 10 11 12 13 13	Improvement to tank at Morwa Decpening the tank at Kanelao Do. do. Jhstod Do. do. Malno Do. do. Malno Do. do. Ratanpor Constructing a re-ervoir at Mawalia Deepening the tank at Wads	2,423 5,104 1,971 330 1,296	58,676 26,511 1,96,220 54,849 28,403 39,806 1,11,746 21,450	35,882	61,099 \$1,648 1,99,191 55,170 29,701 30,800 1,47,628 21,450				
	Miseellaneovs.	!			İ	1			
16	Clearing out trees, roots and collecting carred stones, etc., from the Archeologi- cal buildings at Champlacer.		2,079	u.e	2,070				
	Roilwoy Works. ;								
17	Corstructing Godhra-Baroda Chord rail- way.	30,575	96,640	7,093	1,31,300				
;	KAIRA DISTRICT.	1							
	ROADS.	į			;	]			
	Onioinal Worse.	1	j						
1	Road Metalling.		.						
15	Metalling Ledwil branch read of Kapad- vanj-kibipura tead.	20,926	2,782	•••	22,609				

Mr. K. G. Statement showing expenditure on Works on which relief labour was employed in Kaira and Panch Desai.

Mahdis Districts—continued.

2 Dec 01.

		Expheniture.						
tem Ro.	Names of Works.	From com- mencement to end of March 1000.	From April 1910 to March 1901.	From April 1931 ta September 1901,	Total.	lie:		
	KAIRA DISTRICT-contd.	R	R	R	R			
	I:O.\DS—contd.							
	ORIGINAL WORKS-con'd.							
	Censtruction of Roads.							
19	Constructing the road from Agas to	18,236	26,219	•••	44,455			
20	Bor-ad. Constructing the Mehmadshad-Nahudka	23,115	305	***	23,420			
21 22	read. Constructing the read from Dakoi to Alina Constructing the Matar-Cambay read	37,305	2,089 136	***	30,301 186	:		
	Repairs.							
23	Collecting 10 years' supply of metal at Páli quarry for repairs to Local Fund roads in Kaira Dietrict.	65,023	12,692	***	77,707			
	Railway Worls.							
24	Collecting gravel for B., B. & C. I. rail-	•••	2,070	•••	2,070			
	Irrigation Works.							
25	Clearing and improving drains in Matar	32,178	11,156	•••	43,629			
26	Constructing the Karamand Drainage	31,874	1,01,308	8,650	1,47,022			
	Tanes.							
	Niscellancous Public Improvements	1		ļ				
27 28 29 30 31 32	Decepening the tank at Wansor Do. Gomti Tank at Dakor Do. the tank at Derkinansol Do. Bhobla Tank at Borsad Do. Eyara Tank Do. Rateval and Gopal tanks ut	40,800 43,966 19,876 46,182 3,169	1,33,847 1,82,082 76,235 3,26,709 23,406 71,517	***	1,83,847 1,72,891 1,20,201 3,48,675 69,678 77,676			
33 34 35 36	Ladvol.  Do. the tank at Mahndha  Do. Jankli Tank at Borsad  Do. Gangeti Tank at Anklao  Do. Gam Tank at Alarsa	4,433 18	75,511 - 53 002 95,919 25,943	 34,016	79,941 63,020 93,049 69,969			
37 38	Do. the tank at Traj Do. Gomti and Bodesar tanks at Sarsa.	•••	1,20,015 57,620	3,578	1,33,523 57,620			
39 40 41	Po. the tank at Wanthawali . Do. the tank at Thesra Do. Waderari Tank at Narsanda		30,341 43,903		30,314 43,903			
42 43	Do. Napa Tank	::: }	13,542 7,138		13,542 7,138			
41	Do. Wan Tunk at Borsad Do. Sunjin Tank at Mahudha	***	25,391 3,210		25,391 3,240			
45 46	Do. Karsalia Tank at Mahudha		5,602	***	5,602			
47	Do. Patel Tank at Mahudha . Do. Finao Tank at Mahudha .	***	8.931 12,575		8,934			
49	Do. the tank at Herani	***	1,675	23,630	12,575 25,505			
49 50	Do. the tank at Amiyad-Divel		13	46,850	16,872			
51	Do. the tank at D.	1	***	4,392   11,943	4,392   11,943			
52	Do. the tank at libetashi	***	*** _ ]	1410.00	47,010			

NOTE -Out of above works, the roads mant completing to be of necessary the cetimates are under preparation. The tanks are complete except the tank at Mewalla and the work is in progress. The last moreon were very bad one and very few of the lanks have water in them.

- 1. Q. (The Precident).—You are Executive Engineer of the Pauch Muhals?—Yes.
- 2. Q. Hore you heen there long?—About three months, I was in this district six years ago for a few years, so that I know the district.
  - 3. Q. Both Kairs and Ponch Mahala?-Yes.
- 4. Q. Whot do you think would be the best measure that Government could adopt to protect this district against a future famice?—I um ufmid it would be u very difficult task to protect this district because at the time when water is wanted most, you do not get it; the rainfull is too deficient; in the Punch Mahals it is errol less than in Kaira. As you go higher up in the Panch Mahals the rainfall is still less and the result is that if a tank is constructed it would dry up; the other difficulty is that the soil is too sandy. sandy.
- 5. Q. Is the ground saudy in Kaira and thu Panch Ma-hals?—Yes, in both places; if snything, the soil in the Panch Mahols is more saudy than the soil in Kaira
- 6. Q. But there is some irrigation?-Yes. This year no water could be hed anywhere. Even as regards the drainings cuts that we made two years ago, people tell me that no water mu through thom.
- that no water rau through those.

  7. Q. Sometimes it hoppons, does it not, that there are very heavy showers—once it begins to rain—und you get quite enough to fill your tanks?—Yes, but we most store up that water ut the head of the rivers or let it run; the head of the river is unostly far off; the Mahi is something like, say, 50 miles above the northern part of the Panch Minhals and unless water is given regolorly to the people they would not utilize it; if it is given to them irregularly, they would not be prepared to use it for the purpose of irrigation, because land has tu he speciolly prepared for irrigation and that cannot be doed in a short time. The only way to improve the country by means of irrigation is to here tanks thut would hold a reasonable quentity of water for two years and then the people would ese the is to nove tanks thus would note a reasonable questity of writer for two years and then the people would ose the water. If such u tauk was made, the canals would be very expensive on occount of the saidy nature of the soil, they would have to be lived with mud concrete. In America they have been very soccessful.
- 8. Q. Possibly they might be made with greet advantage by ntilizing famine labour?—They might; but it must be usfaltely settled beforehand on what lines we are going to proceed. Once a project is seltled, the question will be where we should begin. In the beginning I am afraid these canals will not pay even their working expenses because the people are not necustoned to Irrigation in the Panch Mahalis; they are very poor; they have no capital and they are not used to canal irrigation. In the Kano district the people are better off. I suppose in the course of time, once they get accustomed to the use of canal irrigation, they will take. We it, but for a number of years these canols would probably not pay their working expenses.

  9. Q. The working appenses will have to be considered 8. Q. Possibly they might be made with greet advantage
- 9. Q. The working expenses will have to be considered after the ranal tegins to work?—It comes to the same thing. I remember, in old days when irrigation in the Decan was first started, the canals did not pay even their working expenses, but when people got more accustomed to use the woter the canal showed better results.
- 10. Q. If the causes were used?—Then we would be somewhat better off than we were in 1869. In u year like 1899, unless the tanks were made to hold a two years supply, we would not be any hetter off. The rainfall in that year was so slight that there was very little water in the tanks. This year the rainfall was below normal—14 meches—and it enabled people to get their kharif crop. It came in small driblets; it would not have alled the tanks.
- 11. Q. It is not always so? No, we get it in that way in had years.
- 12. Q. Suppose fomine were to come ogain, what is the hest means of protecting your district against it?—We are trying to find sites for tonks in the district, for the construction of new tanks and ne are charing old tinks, that is the heat means of protecting the country against future famine.
- 13. Q. You think the construction of tunks the best thing that can be done !- Yes, for the present. Rehef projects should be specially prepared beforehand.
- 14. Q. Have you tad much experience of irrigation matters in famme years?—No, very lutle. I was for about a year and a half in the irrigation branch; but beyond that the rest of my service has been in the reads branch.
- 15. Q. Do you keep up a programme of relief works in your office?—Yes, we have one.

- 16. Q. Far how many people have you made provision?—At present we have made provision for only about 20,000 reople. This programme was made in Moy last. After the twn years of famine that we had, I suppose, they do not think there is any likelihood af unother famine. On looking up my records I see that some works which were proposed at one time were not begun and that some works were commenced but not completed.
  - 17. Q. You have made provision for 30,000 ?-Yes
- 18. Q. How many were employed last year ?-Oo irriga-on works the number was about 40,000 to 50,000. I am only speaking from hearsay: I was not in the district then.
- 19. Q. (Mr. Higham).—Under whom are the irrigotion works in the Karn district?—They are managed by the Executive Engineer, Ahmedabad.
- 20. Q. That is only a small area in the north of the district?—Yes.
- 21. Q. You have not got a storage tank?—No, we have got a large number of small toaks. They are all under the Revounce authorities. The revenue is collected by them. There was some idea of putting these tanks into repair, but the work has not yet been taken up.
- 22. Q. The Public Works Department does nothing?—
  No, there was some correspondence between the Public Works Department and the Revenue Department. I think the original list contained 1,000 tanks both lorge and emell; the Public Works Department could not possibly take them all np. They wanted to know how many of them were big enough to be worth taking np and repaired. I think the list was brought down to 120 tanks; and the Public Works Department was waiting for orders when the famine came and some of these tanks were repaired by famine jabour. by famine labour.
- 23. Q. Wem all these 120 tanks repoired during the last famine ?-1 could not say: we have repaired a good mony of them.
  - 24. Q. Have you got a list of these 120 tanks ?-Yes.
- 25. Q. They were irrigation tanks P-Yes, they oll irrigate more or less land. We here a definition for large tonks which is as follows—"all tanks giving a revenue of more than Rs. 30."
- 26. Q. What you call revenue is water-mis ?—Revenue on lands affected by these tanks. I um only soying this from what I have heard; it is not on my records. I have heard this definition.
- 27. Q. All those tanks are old tanks ?-Yes.
- 28. Q. There is no water-rate charged on lands under them ?—No.
- 29. Q. Water-rote is put on now tanks?—It is a sort of water-rate; our rate is collected for every aere actually irrigated.
- 30. Q. You feed a great number of these rivers P—Not many; some of those are so fed. You feed o great number of these tanks from
- 31. Q. Do they over fail?—They have done very hadly this year. I am told that in Saharmott there was not more than seven feet of water.
- 22. Q. Has there been no irrigation P.—There was what is called Kharl cultivation in the northern part of my district where there is on irrigation canal. The canel is made on the Khari river and it feeds some of the tanks.

  From these tanks the people irrigate. One of the famine works which I have just started this year is the construction of a large reservoir to collect canal water which is wanted by the cultivators.
- S3. Q. You say that some of the large tracts of the Kaira district are water-logged ?—Yes, they are.
- 34. Q. They have become water-logged within the last two or three years when there was no rainfall f—No, they were water-logged in years of heavy rainfall. In 1900 we made drains which carried off the water and the villagers approved of our plans. In July 1900 we had one or two rather heavy showers and it only filled the channel, which carried off water. It did not rise high enough to fill tanks.
- 35, Q. Where is it carried off?-Into the Gulf of Cambay.
- 26. Q. There are no tanks f-There are tanks, but they are mostly at a little higher level; and drainage has to be neressarily at the lowest level.
- 37. Q. Do you call them irrigation works?-That is the clossification in our books.

Mr K G

2 Dre 01.

- Mr. K. G. Desai. 2 Dec. 01.
- 33. Q. Were all those tanks in the Kaira district cleared by the Public Works Department or as Civil Works?—They were cleared by the Public Works Department. The work done by the Civil Department is not included in my list.
- 80. Q. As regards tanks in the eastern district of the Pauch Mahals, there are plenty of Public Works Department tanks P—Yes.
- 40. Q. Where is that, in the lower hills?—Yes; the land is very much out up, owing to there being many raviues. It is a rocky area consisting mostly of linestons. There is some chance of keeping water if it is fonad; in the other part a reservoir can be easily constructed and will probably hold water.
- 41. Q. And on the western side?—We can make tanks, but there is great doubt of their holding water; there is no rock; the ground is sandy.
- 42. Q. Were you in charge of the Mowalis tank?—No; there is mother Relief Engineer in charge of it; it is not complete yet; but I think during this famino, they will probably be able to complete it.
  - 43. Q. You have nothing to do with that !- Nothing.
- 44. Q. Rs. 2,03,090 was spent to deepen that tank ?—It is for the water-supply of the town and for irrigation.
- 45. Q. Have you seen the Mowalia tank?—No; I have only been in the district three months.
- 46. Q. Do you know how much they have deepened it ?-I have no idea.
- 47. Q. (Mr. Ibbetson).—Are there considerable forest areas in the Panch Mahals !—Yes.
- 49. Q. In preparing your programms of famine works did you consult the Forest Department as to what suggestions they have to make ?—I did not.
- 49. Q. I understand you prepared this famine programme?—It is partly prepared by the Collector; the Collector and the Executive Engineer consult together and prepare the programme. The revised programme, I think, was propared in consultation with the Relief Engineer and the Collector.
  - 50. Q. In your time ?-No.
- 51. Q. Are any forest works contained in the programmo?—Not unless the new roads that are being made have to pass through the forests, may be considered forest roads.
- 52. Q. If there are forest roads would they help the forests?—They would certainly help the forests.
- 53. Q. They are used for forest purposes only ?—No; they are used for forests as well as for general communication. The reads chosen are such as are wanted to connect different places; they would help the forests and the general public too.
- 54. Q. Is any clearing of the jungles included in the programmo  $P\!-\!N\sigma$  .
- 55. Q. (Mr. Rajaratna Mdlr.). In your note to the Engineer on special duty you refer to tanks in the Kalol talnias—were they made to benefit the forests?—I am not aware that they were made specially for the bonefit of the Forest Department.
- 56. Q. In answer to Mr. Higham yon said something about the repairing of tanks yielding Rs. 30 f—It was not the cost of repairs; it was the amount of extra revenue that was derived by regulating the demand for water in these tanks. But for the existence of these tanks these, lands would have remained unenlitivated; owing to the existence of these tanks a certain number of fields are paying a higher rate of assessment. Government at one time took up the investigation of tanks which were used for irrigation and those which required to be repaired or put into good order were ordered to be repaired by a Government Resolution, and only tanks that gave a revenue of Rs. 30 were taken up by the Public Works Department.
  - 57. Q. They were old tanks ?-Yes.
- 58. Q. In para. 8 you refer to certain water-logged lands. Are these lands left unenlivated in consequence?—Some of them are not.
- 59. Q. Is the out-turn affected? A part of the land went ont of enlitvation altogether, but some of those water-logged lands were taken up by the people for grass. There

- are also lands which in a year of a very heavy rainfall would be water-logged and could not be used for cultivation, but in a year of short rainfall are dry and are used for rabi crops.
- UD. Q. Practically they have not suffered seriously ?-
- 61. Q. (Mr. Muir-Mackonzio).—As regards these water-logged lands in Kaira which you showed me the other day, the offeet of the drain this year has been to carry off what little water there was in the land. Is there say remedy for that P—Yes, by putting regulators on the drains—putting cross bunds with slaices in them.
- 62. Q. That would not be a difficult or an expensive operation ?—No, not at all.
- 63. Q. In that way you would make the drains useful in both dry and wet years?—Yes; in 29 years out of 30 they would be very useful.
- 64. Q. You would advocate, as a suitable famine work in the Kaira district, the digging of new irrigation tanks for rice cultivation?—Certainly, where there are suitable sites and where you have a fair chance of filling the tanks.
- 65. Q. In other places you would not construct irrigation tanks?—No, there are no good sites for tanks, the leakage will be heavy.
- 66. Q. I believe projects for two large tanks are under consideration?—I have not seen the sites; and I nm not able to judge at present whother they should be taken up or not.
- 67. Q. Do you think some of these tanks should be fed by a river in a year of no rainfall?—My opinion is that some of them will not fill at all; but I think if reasonable care is taken they should fill.
- 63. Q. As regards the tunks under rice onlivation for which a special assessment is charged, how are they working?—All the older tanks are generally below the level of the country and most of the cultivation under them now is by lift.
- 69. Q. In a year of good rainfall?—It is for a short time by flow but mostly by lift.
- 70. Q. Would not the construction of such tanks as famine works be at least as useful as any other kinds of work f-Yes.
- 71. Q. And would it not also be a fairly chorp famine work?—Yes, if you could find good sites for tanks which could hold good water and which could be protected by bands.
- 73. Q. You would prefer roads?—Yes, if they are wanted. In the last famine three roads were taken up. I should like to see them completed. I am not in favour of starting new roads as further expenditure is required to put them in good order.
- 78. Q. Sooner than start now roads you would have these inferior tanks?—Yes, I should prefer them.
- 74. Q. Would they have any effect in substituting an area of rice caltiration for one of dry cultivation?—Probably they would have that offect, but in most cases they would have a rather peer chance.
- 75. Q. Would that swe rice in a year of somewhat inconsistent rainfall?—Yes.
- 76. Q. How much will a well forty feet deep cost ?-
- 77. Q. How moch would a cultivator be able to do it for ?—He may be able to do it for Rs. 100 less.
- 78. Q. I suppose his work will nat be nearly so good !--
- 79. Q. How long will a well built by the Public Works Department last?—With slight repairs it may last for centuries or it may give way a few mouths after it is made. It depends upon the man who makes it.
  - 80. Q. It would last a profty long time f-Yes.
- 81. Q. Would it irrigate well?—It would not be a failure, but at the same time it would not be very good.
- 82. Q. It would go in twenty-five years?—There are so many factors to be considered before answering such a question.
  - 83. Q. It would go rather soon ?-Yes.

### FIFTEENTH DAY.

# Ahmadabad, 3rd December 1901.

WITNESS No. 12 .- Mn. P. R. Munta, Deputy Director of Agriculture.

# Answers to printed questions.

- 1. The answers refer to the Province of Gujarat, where I have served for the last seven years as Survey and Settlement Officer.
- 3. There is no obstacle to the extension of irrigation arising from the cases mentioned, except in parts where the black cotton roll prevails.
- 4. Under the Bombay system, enhancement of assessment would not take place on account of works constructed by private capital, nor any exemption is given.
- 5. For the encouragement of leans under the Land Improvement Act, I would resommend-
  - (1) Interest at 5 per cent.
- (4) Total remission in one of failure of the attempt to obtain water or oo obtaining salt water, and remission of august distallments in case the well runs dry or turns brackish after its completion and before the lam is paid up.
- (6) Small onnoal instalments of repayment will be greatly appreciated by the people.
- 6. No big irrigotion work has been projected in Gajarat to produce the effect of depopulating unirrigated tracts, and no such project is under contemplation.
- In rice-growing tracts, people evince a strong desire to have the existing lanks improved and new enes dug.

B.

There is no canal of continuous flaw in Gujarat. If such a canel were saccessful in Gujarat, it would add about Rs. 50 per acre per annum to the net carnings of the cultivators.

c.

There are two small causls of intermiltent flow—Khari sluces in Kaira and Kharient in Ahuadabad. They supply mater during the mensoon, and no chiefly utilized for rice coltivation. They do not maintain their full supply during the years of scauty rainfall, and in the famine year they tailed allogether.

13. Irrigation will increase the value of produce of land under auch canals by readering it passible to coltivate two harvests. In a year of good rainfall, such lands will grow rice followed by rat or gram, wheat, barely, etc., according to the lecality. The second crops are possible, it there is sufficient late rainfull and the canal holds aut till October and November. As a rule, however, in Ahoundabad superior variety of vice is grown, which matures late in November, and a second crop is not often possible.

The yield of rice depends upon the position of the rice beds.

Rice beds situated higher up and neerving only the rain mater will yield about 18s. 20 to Rs. 25 worth of produce; these situated lower down receiving the occumulated water of the higher levels, will produce a crop north about Rs. 30 to Rs. 40; and these receiving cause or tank water, in addition, will produce a crop of superior rice or of inferior rice and a record crop of rai (Dolicios lablet), etc., worth Rs. 50 to Rs. 70.

The produce will be nil in the first case, and reduced to less than half in the second and third cases in o year of scanty minfall: in n year of drought there will be nn erop in all cases.

- 14. It will not be possible to grow rice when the mouseon barets too late. The rice seddlings will be teo far matured to be fit for transplantation. If rice cannot be transplanted, enother crop will occupy the rice beds, provided there is ample rain at the end of the scason. Too early execution will reduce the yield to almost nothing.
- 15. Irrigation from canals, which work only during the monocon or from small tanks which are also utilized only during the monocon, is applied only to rice crop. Such a crop is not generally irrigated from wells in addition to canal or well. A very small need in Sunt is irrigated from tanks, and later on in the year from wells when sugarcane is cultivated.

- 16. Please see 13.
- 19. As irrigation from canals or wells has not been carried out on any extensive scale, no answer can be given from experience as regards any damage resulting from it.
- 22. Private enusis do not exist. Canals are not possible in Gojarat: only two projects have been monted by the Poblic Works Department in past years.

D.

- 13. As in the case of canals so in the case of tanks, irrigation refers only to the rice crop. Tanks in Gajarat are small village tanks, which fill up during the rains, and no water is available for irrigation after the essention of the rains. The area irrigated is from a fraction of an acro to about 100 acres. Average meas for each district are given in Table V of the memorandum prepared for the Commission by the Director of Land Records and Agriculture.
  - 24. Pleaso see 13.
- 25. Please see 14.
- 27. Please see 13.
- 28. No separate charge is levied for tank assistance: it is included in the land assessment. The assessment is levied on the survey number or the recognized share of the survey number, and is charged, whether it is irrigated or not.
- SO. No annual charge is incurred on the repairs of tanks. All that is required is to dig them deeper when they silt up. In the black soil districts, such as Sunat and Broach, such repairs are needed every 20 years. In Kaim, where the light soil (goradu) prevais, the tank silt is utilized for manuring adjacent fields, and no such repairs are needed.
  - 31. Tanks are not constructed by private persons
- 33. It is not possible for privale persons to construct

#### E .- Welle.

34. In Sprat the average depth to the water is 20 feet in garden lands, and from 30 to 40 feet in other soils; in Breach the depth is 45 to 60 feet; and in Kaisa the average depth is 35 feet, but in places it goes down to 35 feet and even more. In Ahmadabad the depth is the same as in Kaira. In the Kalol sub-division of the Panch Mahals and in the villages of Godhra, adjoining Kalol, the soil is gorat and the depth to the water is about 30 feet.

gord and the depth to the water is about 30 feet.

In the western portion of Godhra, seanty woter is obtained at a depth of 20-25 feet, beyond which solid stone is met with, making it expensive to go farther down. In Jhalod the water is deep and scarce. In Dohad the wells are made in low-lying fields, and scancy supply is obtained at a depth of 20 feet, beyond which took is met with. The areas where wells are liable to fail or become the saline are difficult to particularize, but such information exists in regard to each ozisting well on survey records. It may, herever, to generally stated that sufficient water of good quality is met with throughout Surat, except the Monda's taluka. In Proach (excepting Ankleshvar, where the conditions should to Surst prevail), the supply of well water is seanty, as a rule, and simutimes brackish. In Kaira the tract known as charden, comprising the talukatof Anand, Horsad, and Nadiad, the well water-unply is generally plenty, and of good quality. The same conditions only to the acrust tracts of Ahmalabad. The average cost of construction is from Ris. 500 to Rs. 700. Wells last 50, 100 or more years. Water is raised by leather large.

Wells exist in cultivated fields, and there is eaough area to which irrigation could be extended. The average area schooly irrigated from a well could not exceed two area.

25. It is difficult to compare the values of irrigated and men-irrigated c.ops. The crops irrigated from wells are sugarcane, yams, turmeric, ginger, potatos, sneet potatos.

Mr. P. R Melda

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Mehta ouious, chillies, and vegetables. But these crops are generally grown ou rich lunds, and the figures given below are uet meant to apply to hiack soils or to soils of pour descriptions. It may be stated that the cultivation of these crops leave a net profit of shout Rs. 50 per acre. Sugarcano is the most important of the irrigated crops. The net profit resulting from it is Rs. 100 and upwards. In addition, it was the resulting throughout the ways to the cultivation. it provides work throughout the year to the enlivator and this hillocks. In Gnjarat, although sugarcane occupies the field far 12 months, it is really a two years orop, as, although the cause are planted in December—January, yot, the field has to be mannred and got ready during the previene monsoon months.

A dry-orop rotation will yield an ennual produce worth Rs. 20 to Rs. 25. In case of better soils and apporter tillage, the value will rise to Rs. 40 per acro. Cultivation charges in case of sugarance amount to Rs. 400. In case of other garden crops, the cultivation charges come to Rs. 100 to Rs. 300 and the produce to Rs. 150 to Rs. 350 and more.

In a year of scanty rainfall, the value of a dry crop will be reduced to Rs. 10 and less, but if irrigated from n well will rise to Rs. 20 and more per acro.

In a year of ample minfall, the produce will not be much affected.

In a year of drought, the produce will sink to nil, and if irrigated from a well, it will rise to Rs. 15 and more. In addition, a fodder crop could be grown which can be valued at Rs. 20 and more per acre.

37. No oxtrn rate is charged for wells under the Bombay eystom.

38. It may be said that serious difficulties are not eucountered in the selection of a spot for wells. In tracts, where it is uncertain, whother the water will he sweet or sult, the preliminary expecditure in ascertaining the same will not exceed Rs. 20, which, if oncouragement af well construction is desired, shall be met by Government in case of failure.

No seriona difficultice are encountered in the construction

No assistance has been, up to as late as the last month, affered by Government in the shape of expert odvice. The Honourable Mr. Lely has, however, lately arranged to supply Mamlatdare with boring tools. I am respectfully of opinion that expert advice is greatly needed with regard to borings. But it does not exist. No officer is accuminted with the focts and figures in connection with borings. The people have used being tools. Wells have been bered up to 20 to 30 feet by people with success. But they have not been able to go deeper for want of knowledgs on the subject. Welle have been bored successfully in Surat, Kaira, and Ahmadahad. In Broach, where there is a general scarcity of water and the supply in many villages not quite entition to reven the domestic needs of the people, n well in a spinning mill dug to the dopth of 120 feet produced an ample supply for the hollers, and the water level is maintained at ahont 40 feet. I am respectfully of apinion that an officer should be put on this work, who will study all the existing facts, provide being tools and a competent mechanic wherever required, and facilitate the work generally. I am confident that people will willingly pay all reasonable costs, if the hring turns ant encessfal. In the heginning nt least they should not be charged in case of failure. As all the extra help will be provided by the owners of wells, the costs te Government will not be high.

Character of Soils.—Breadly spenking, there are two varieties of soil prevalent in Gujarat: (a) the black cetten seil, and (b) the gorat or light coloured soil. The former may be termed cluy loam, and the latter sandy loam. In the Surat district there is mother class of seil called the Surat district there is mother class of seil called garden or bagayet soil. It occurs in patches. Here garden enlitivation is carried on par excellence. Sugarcane, ginger, turmeric, rice, eweet pointoes, chillies, yams, etc., ore the ordinary crops grown. Irrigation is hy wells, except in onse of rice, which is from tanks In anden soils water is faund at not deeper than 20 to 25 feet. Small pakka (brick and olunnam) wells are constructed, costing from Rs. 150 to Rs. 300. As a rule enflicient wells exist, and no great demand for taking advances exists in such nreas. There are other kinds of ecils known by various local names; but they fall, broadly speaking, into oce or the other hend of the two chief varieties noted above. Generally these varieties are inferior to what are strictly Generally these varieties are inferior to what are strictly termed block or gorat lunds. On river banks allavial or bhatta soil exists in patches. Those are subject to inundations and are not fit, therefore, to grow a twelvs-

mooth erop such as sugar cane. They grow tobaccomixture of jowari, and other crops. They are never mixture of journi, and other crops. They are never irrigated, because the crops they grow without the aid of irrigation are highly remunerative. Besides the river may be tidal, and irrigation is therefore an impossibility.

As regards their suitability for irrigation, gorat soils excel all others (except bagayot lands). Irrigation is not practised in black catton soil. The black soil prevails in the Surat and Broach districts: gorat in Kaira and Ahmsdabad. In the Panch Mahals, the Kalal sub-division is gorat: other talukas have interior black soil. The low-lying fields of Dohad Mahal are, however, very fertile.

Crops grown under Irrigation .- In disensing crops grown under irrigation, a sharp line has to he drawn hatween the rice crop and all others. They must be discassed separately, as the conditions under which they are grown are quite different. First as regards rice crop.

Rice is grown in all parts of Gujarat to a smaller or larger extent. Rice is irrigated from tanks. Tanks are small village tanks, and a few beds of rice from a fraction of an acre to, say, about 100 acres (as many ac the capacity of the lauk will allow) are cultivated under cach

Other irrigated crops, each as eagarosne, yams, ginger vegetuhles, otc, are irrigated from wells.

Rice crop requires water throughout the monsoon for its successful cultivation. The more the water, the better the crop. Sugarcano requires water during the mossoon, only if there is a long break. The distribution of water is cantrolled by the villagers themselves, and the water is takon in torns from the tanks. In case of rice, the tank water assistance is ossimilated into the laud assessment. Both are separately shown in survey records. But for the purposes of cellection, only the total assessment appears on the revenue records.

Tanks can he canstructed in almost all soils. Black soil holds water better than other soils. No masonry cere is useded. Tanks are utilized for rice cultivation, and tank water is ntilized every year. As noted above, larger the supply of water, batter the erep. Therefore, there could be no falling off in years of fair or good rainfall. As explained ahave, the revenue can show no falling off under the Bombay system. Construction of tanks in clack cetten soil or soil of any other description in localities where rice is grave, will increase the outtiration of rice. Rice group is grawn will increase the cultivation of rice. Rice crop is a paying crop. Tank assistance can be charged. Therefore, the construction of tanks is profitable both to Government and the people. In Broach and some talukae in other districts, no rice extension can take place. Rice depends for ite eucersiul cultivation on manure; mauuro means addi-tional keecing of cattle; eattle cenuot be maintained unless grazing lauds exist; and in Broach no such facilities exist, the whole area being under cultivation. Basides rice requires a large surplus population of lahourers at the time of transplanting and harvesting, which does not exist in Brosch. In the Jambusar taluka of Broach, inferior rice is grown on dry-orop lauds, and all over Breach, except near the eea coast, inferior rice is grown between the rows of cotton orop, when the black cotton soil field is kept fallow during the previous year. Such rice oultivation is done on a small scale, and does not affect the general remarka made nhont the district as regards the policy of extending tank irrigation for rice cultivation.

Wells .- In the Snrat district the prevniling soil ie black and wells will only be utilized during a severe famine. The depth to the water varies from 30 to 40 feet. In blandy talaka from 40 to 60 feet.

In Breach the prevniling soil is black and of a stiffer enture than the Surnt black soil. The difference between the two will be apparent, when it is stated that jowari (Sorghum vulgare) is grown as mouseed erop in Surat and as a rabi ctop in Broach. In fact, except rice, no crop is grown in the black soil of Broach which matures between October and December. In Broach the depth to the water is 45 to 55 feet. The supply of water is scanty. Wells no is 45 to 55 feet. The supply of water is seanty. Wells not huilt on the bank of the village tank to supply the domestic wants of the villagers.

The part of Gujarat where well extension will be most succossful is what is known as charotar, coloprising the talukas of Anund, Bersad, and Nadiad in the Kaira Collectorate. It is well known for ite fertile gorat eoil, and the skill and intel-

<sup>\*</sup> Tanks silt up sl-wiy. Excevation every 2) years would be desirable in Surat. In Keira and Ahmadabad the gerat coil is benefited by meaaring with tank earth. Excavations here ere therefore celdom found necessary, as the lenk silt is remared by the people to manure adjoining fields.

ligence of its cultivators. It is one of the most densely populated tructs in India, and the land is very much sub-divided. This may offer some difficulty in the extension of well construction. Hat people are accustomed to pay for the wee of wells to neighbours, and means may be devised to build wells under a joint partnership. Joint purtnership in wells exists, and when a piece of land possessing a well, held hader joint partnership is sold, it passes hadds subject to such cacumbrance. Here irrigated crops, elleft fodder scops, were grown extensively dailing the last famine, both from pakka and lackela wells. The depth to the water is 30 to 40 feet, hot in parts it exceeds 60. In ordinary years, wells are mostly utilized to woter the tobacco crop, which reduires about two wateriogs after the cessation of the rains. Heachish wells containing the valuable salt of potassiom nitrate are found and are coosidered valuable for tobacco irrigation. In the Ahmadahad district there are gorat tracts to

In the Ahmadahad district there are gorat tracts to An the Annuages district faces are good tracts of which the same conditions upply as those marrated it case of charcter. But in many parts of this district well extension is not possible, because the water-supply is scant; and brackish to rail, and owing to the premience of black sile.

In the Pench Mohals, the taluka Kutel and the adjoining villages of Godhra have gorat sell, and well irrigation is practised by the superior class of cultivators—the Patridors. rillages of counts are parties class of cultivators—the l'attidora. Ahundant sopply of water is chimined at a depth of shoot 30 feet. In eastern parts of Goodbara, a scanty supply is obtainable at a depth of 20 to 30 feet, boyond which rock is met with, and the propla have not the means of blatting and deepening the wells. The soil also is poor and not suited for irrigatiou, unless beavily monured. In Dohad and Jhalod the surface of the coentry is undulating. A scanny supply is obtainable in Jhalod in low-lying fields at a depth of 20 feet, after which hard stone is met with. In Dohad the supply of water is scanty, and, as a rule, very a depth of 20 feet, after which hard stone is met with. In Dohad the supply of woter is scarty, and, as a rule, very deep. In Halol the soil is either black or stony and shallow. The cultivators are mostly Bhils, and are not likely to take advantage of wells in famine years even where there may be a sufficient supply. On the whole it may, therefore, he stated that the area to which the construction of wells may be profushly extended is limited in Gujurat. At the same tion, an neiter palicy of encounging well construction, wherever irrigation is possible, will result in a great deal of good, and with this object in view I would advocate the opening of a separate department. Such a department could construct wells departmentally where the cultivators

are too ignorant to take up the work themselves, or advance takes in small instalments and keep n watching eyo to see that the money so advanced is utilized for the purpose of well construction only.

Under the Bombay system, Government will derive no direct advantage in the shape of increase in revenue by helping the people in the construction of wells. In garat soils well will irrigate from two to four neres. In the famine year two crops were grown in surcession in charotar. In the black soil, an average of only two neres could be irrigated from a well.

A well with a diameter of 8 to 10 feet and a depth of from 40 fret to 60 feet will cost from 11s. 500 to Re. 700.

Besides these two means of irrigation, eig., small tanks Resides these two means of irrigation, riz., small tanks and wells, it is dangerous to advocate any other system at irrigation in Gujarat. Irrigation canals will, I am afraid, prove the rain of the province. Gujarat is a flat and level plain, and wherever any serious difficulty has been experionced in the way of soccessful agricollare, it is in the chaps of water-lagging. In almost agency part of Gujarat, alt. offerseence can be observed in patches in low-lying lands. It is, therefore, to be frared that the introduction of casals will increase the sall efforcemence and do more burn than good by creating user lands as in Northern India.

There have been two axed presents a provints most in this part.

good by oreating user lands as in Northern India.

There have been two canal projects monted in this port: (i) the Tapti canal, and (ii) the Sabarmati. In the case of the former it has been decided, I believe, that it will not pay. It will pass through a tract of black cotton soil and will not be therefore utilized lu ordnary yrans; it may, however, create water-lagging to a serious ordent. The Sabarmoti canal has been proposed as a paying investment. It may or may not pay. It is, however, probable that the part of Sanand, through which it passes, may be damsged by salt efflorescence. Salt efflorescence is observable in Sanand, and this question requires to be thoroughly threshed out before the project can be advocated as a boucheisl measure.

Drainage —There are parts in all the districts of Gujanat which are low-lying and water-logged. Prainage channels hove been constructed in some of them. In some cases drainage channels are not feasible for want of proper fall. As a rule, low-lying lands form salt on the surface. In some cases lands have been relinquished owing to the formetics of two reach salt. formstion of too mach salt.

- 1. Q. (The President)-You are Deputy Director of Agriculture, I understand?-Yes, I have lately been mpointed.
  - 3. Q. Is that for the Bombay Presidency !- Yes.
  - 3. Q. Where are your headquarters ?-Poona.
- 4. Q. Were you here during the recent fumine?—Yes.
  5. Q. Wou say in your note, "there is no obstacle to the extension of inleation arising from the causes mentioned." extension of inleation arising from the causes mentioned, except in parts where the black cotton soil provisits." Would you kindly give us your views nboat black cotton soil. It causes a great part of India, and apparently from the evidence takon, does not require intigation. We find there is no question about the oultivators being gind to have the rains of Heaven on block cotton soil, what then makes them relactant to take irrigation; would they take it if they could get it for nothing?—Except for rice no irrigation is practicable in black cotton soil; this soil is mostly confined to Surat and Broach. The Baroca railway statino makes conveniently the division of the two principal varieties of soil—black and gorat.

  6. O. You say that rice cultivation on black cotton soil
- 6. Q. You say that rice cultivation on black cotton soil takes irrigation ?—Yes, largely, and it is almost more remunerative than rice irrigated on goral soil, because black soil is less pervious to water than goral.
- 7. Q. We heard in Kathiawar that black cotton soil would the water for mything if there was a substratum of muram; what is your opinion?—We have no substratum of muram: in the case of muram, water passes down the nuram and along its sorface too, thus drawing the sarface
- B. Q. (Mr. Highur)—If muram is impermeable, does it take nater !—It way not take it.
- O. Q. (The President)—Do you think the agricultarist is right in refusing irrigation except for rice cultivation ? -Yes,
- 10. Q. Take a crop of juari, would it be injured if it got water?—In the case of juari, where water is required only

- ones to save the crop, it is impossible to irrigate it from wells; beause the black cotton soil cracks and the water passes into the oracks without making any progress over tha soil; the cases of a conal it would be easier to irrigate it, because the canal can flood the field, at the same time water is seldom required except in the hot weather. The irrigation of black cotton soil is impracticable and mat prolitable. Cotton doesn't do well nuless the soil cracks, and water would prevent it eracking and make it as the cultivators express it "thanda" that is to say, it would not produce a full crop during the succeeding year. In black soil, cotton ripens and the halls open and os the weather becomes warmer and the sail cracks. In goret soil, cotton grows into a hig tush and does not produce much lint. once to save the crop, it is impossible to irrigate it from wells; into a hig bush and does not produce much lint.
- 11. Q. What happees when a storm of rain comes on black cuton soil P—Tho black cotton soil cracks in the hot weather, and as soon as a slight shower of rain fulls, it swells and the cracks are filled up. When the rainfall is small but well distributed, it produces good crops, and when the rainfall is heavy the ootton plants turn yellow and lose their vigour. Unless a spell of suany weather succeeds, they do not thrive.
- 12. Q. Would not those conditions hold equally well, if a small amount of irrigation were well distributed?—Nn; there is no way of allowing a little water over the suil; it goes into the cracks in the black cotton roll.
- 13. Q. It retains the moistore in itself?—It has great power of absorbing and retoining moisture. If you tarm over a block of soil with nerow-bar, you will find it wet even io May.
- 14. Q. Is there much difference in the black soils of Breach and Strat ?—The difference is that the Breach soil is put or and the country flatter than in Surat, where the country is more or less uneven; thus allows the min water to pass off easily. The soil in Surat is mixed with lime. Broach district; cotton is sown in June, but does not right ill February. In Surat, juari is grown as a monecon erop: fa Broach as a rabi erop.

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- 15. Q. So where you find this black cotton soil, you would nat recommend ony great oatlay on irrigation works, unless the people are prepared to sow rice and take to rice on livation?—Yes, but there is no village which is not prepared to sow rice if you give the water. If you increase the rice are all property recompletes the property of the millages for the you directly promote the prosperity of the villages in the rice-growing tract; if you provide irrigation works, you can depend on the people constructing kiaris or rice-beds.
  - 16. Q. Is rice more profitable than cotton ?-Tes.
- 17. Q. Woold what you say apply to Brooch ?—In Broach, as I have stated in my answers, it will be difficult to extend rice cultivation, because Broach is not n rice growing district, and the population is sparse. You want 10 to 15 labourers per nore at the time of transplant-ing and harvesting. I have been told that, if the cultivation is extended, the labour-supply will come; but I do not think so, because the labour will be required during the monsoons, so, occane the indoor will be required utring the monodos, and people of other localities have generally work at that period in their own villages. In Broach, it is the custom for labourers from other parts to come over during the harvesting operations, but that is after January when there is no work in their own villages. Again, rice calti-vation requires manure, and to produce manure you want extra eaths, which would mean a grazing area, and that is not available in Breach, because all the land is cultivated.
- 18. Q. Have you any experience of the Nerbudda and Tapti Valleys? Does the same hold good there?—Yee, the irrigation from the Nerbudda and Tapti will go through black soil, but in my opinion, there will be a great chance of the land becoming usar.
- 19. Q Won't they irrigate in that country ? Only rice, there must be some dry crops still for proper rotation.
- 20. Q. (Mr Ibbetson)-I understood you to say that if wa could give them water they would put every acre under rice; what you now say seems to conflict with that statement?-I was referring previously to small tanks only.
- 21. Q. (The President)-You say, " for the encourage moat of loans under the Land Improvement Act, I would recommend interest at 5 per cant." Are these loans largely availed of in Gujarat ?—Of late years they have been.
  - 22. Q. What are they taken for ?-Mostly for wells.
- 23. Q. Do they take them for the repair of bunds ?-That is supposed to be done by Government.
- 24. Q. You have montioned interest at 5 per cent. What is the present interest asked for by Government !-- I think it is 5 per cent.
- 25, Q. Do they find that interest high. Would they avail themselves more of it, if it was lower ?—I should say that smallness of the instalments rather than of the interest would be a greater indacement.
- 26. Q. You think Government recovers too rapidly? -Yes.
- 27. Q. What period would you recommend? At present the policy is to grant from 10 to 15 years: 20 years, which is the law, is not given.
- 28. Q. I understand that the system in Pombay is that, if a man makes a well, it is not placed under wet rates ?-Yes.
- 29. Q. Supposing that, instead of recovering takeri by instalments, Government merely mode a man pay wet rates for a certain number of years?—It would come to the samo thing.
- 30. Q. You say in reply to question 13, "the yield of rice depends upon the position of the rice-beds. Rice-heds situated higher up and receiving only the rain water will yield about Rs. 20 to Rs. 25 worth of produce, those situated lower down receiving the accumulated water of the higher levels will produce a crop worth about Rs. 30 to Rs. 40"; that merely means they get more water?—Yes.
- 31. Q. I suppose rice is the only crop cannls would irrigate P—Practically we have got some highly fertile garden lends in which extensive irrigation is practised from wells, and these are well provided with wells.
- 32. Q. They are exceptional, I suppose P—Yes, they occur in patches; no aid is necessary.
  - 33. Q. Private canals don't exist !-- No.
- 34. Q. Do yau mean that they are not possible on account of the configuration of the country ?—Yes, I mean that in Surat you would do more harm than good by introducing a large quantity of water, and so increasing water-logging and salt efflorescence.

- 35. Q. (Mr. Muir-Mackenzie)—You don't mean that they would be impossible ?— No, but the herm done by canals would be greater than the advantage derived.
- 36. Q. (The President)—Have you seen the effect of drainege upon salt offerescence ?—We have get low-lying lends which produce salt efferescenes and some which do not; I think it depends upon the way they dry up.
- 37. Q. You are probably aware that in certain parts of India salt efflorescence has been checked, and lands washed by effectual drainage?-No.
- 38. Q. You say in reply to question. 30: "No annual charge is incurred on the repairs of tanks; nll that is required is to dig them deeper when they silt up. In the black soil districts, such as Surat and Broach, such repairs are needed overy 20 years. In Kaira, where the light soil (goradu) prevails, the tank silt is utilized for manning adjocent fields, and no such repair is needed." Are these repairs done by the Public Works Department?—Yes.
- 39. Q. How is it no annual charge is incurred?-It is periodical, not annual.
- 40. Q. Have you had much experience of tanks silting up?—I don't think there are any dain existing. Tanks want digging periodically. We cherge a water-rate to the people who are supplied. There ought to be a more systematie plan of deepening the tanks.
- 41. Q. Would it he better to take them out of the hands of the Public Works Department, and give them to the people !-- 1 he people will not take them up.
- 42. Q. Why?—Because they pay for tank himagat or essistance, and therefore expect Gorennant to repair the tanks. People, even if they did not got sufficient water, would not allow the himagat to be cancelled, and thus less their right over the tank. They would want in the hope that the tank would be repaired.
- 43. Q. Even, if Government were to eny, we will reduce your wet assessment by a cornain percentage if you undertake the maintenance?—They would not agree if Government removed the whole water-cers. The cost of repairs would be very great and beyond their means, because the tanks have not been repaired for many years.
- 44. Q. Do I understand that you consider Government should do more than it has done in the repeirs of miner tanks ?-Yes.
- 45. Q. Have you may figures to support that statement?—In Surat the tank assessment comes to Rs. 60,000, and I think the charge incarred is Rs. 10,000 a year, that is repair charges.
- 46. Q. So that Government make n olear gain of Rs. 50,000?—Yes, if you wish to put it that way.
- 47. Q. (Mr. Muir-Mackensie)—You oonsider Rs. 10,000 much too little of course to spend?—Yes.
- 43. Q. That is because the tanks have been left so long without being repaired?—Yes.
- 49. Q. They were left a long time without any repairs at all?—Yes.
- 50. Q. If the repairs had been dono regularly and numbally, do you think the cost to Government would have exceeded Rs. 10,000?—Possibly not.
  - 51. Q. Would it exceed Rs. 20,000 ?-No.
- 52. Q. That is to say, if the tanks are sunnally regained Government can make a very reasonable profit upon its water-rate?-Yes.
- 53. Q. Perhaps Government would have to spend some Rs. 3,00,000 in order to put them into repair f-Yes.
- . 51. Q. That is, because they have been left so long out of repair?—Yes.
- 55. Q. (The President)—As regards the construction of wells, have the recent famines created any stimulus. Are more wells made now than befare?—They made some wells during the famine, but the people cannot be expected to do anything for the next ten years.
- 55. Q. Does not even the feer of a future famine induce them to make them f—They are ufraid to incur fresh liebilities. There is no money left in the country after the late had years topped by a severe famine.
- 57. Q. Some witnesses have recommended that Government should itself make the wells, do you approve of that?— From the cultivator's point of view, it would be a good
- 58. Q. Is it your experience that there is much difficulty about determining the proper site for a well?—None at all ; as a matter of fact, we have very little difficulty, because ye

have no hard rocks. It is possible to dig to water level, 40 feet, at n cost of Rs. 10 to 14. 15. The cost being so little, that elaborate investigations and the use of apparatus are nat necessary.

- 69. Q. How do they sink wells?—They first make a hole, and when they reach good water, they put in a wooden frame and go on building and sinking.
- 60. Q. You say in reply to question 24 "wells exist in cultivated fields, and there is enough area to which irrigation could be extended. The average area actually irrigated from a well could not exceed two ocres." That is a small area ?—Perraps, but that is my experience thaugh statistics bring out three agree; there are many wells that do not irrigate at all.
- 61. Q. lint if the wells ore in the hands of a good cultivator, how much could be trigate from a well?—He would irrigate in yorat soil four lofive neres and perhaps not more than two acres in black soil. That would be a well of one or two mote.
- or two mets.

  62. Q. I understood you to say that, owing to the depth of rock, there was no difficulty in fixing the site of a wall; but you say, in reply, to question No. 38—"I am of opinion that expert advice is granily needed with regard to borings "P—That refers to the period after they have made a well. Boring appearants to deepen wells after they have been already built 30 to 40 feet, and experts to work them are greatly needed. The peopla themselves use such apparatus and have succeeded in improving many wells. A well costing its, 1,000 which, but for the horing, would prove useless for want of sufficient water, would become ethcient by the expenditure of an extra its. 20 to its. 50 spent on horing 20 to 30 feet, but the people do not properly understand boring, and their present efforts are haphazard. It is, therefore, incressury to have an officer who has studied the anbject.
- 63. Q. You say, "on river bonks ulluvial or bhatta soil exists in patches;" these are subject to immediate These lands are not protected ?—No, bhatta is that soil on which alluvium is deposited every year in high floods.
- 64. Q. It is a positive benefit to have the river flood on il ?-Yes.
- 65. Q. I understand you are not an inlocate of large tanks. Do you mean by n large tank one irrigating 5,000 acres ?—Yes.
- 65. Q. Yes. Would you object to storing water on a large scale like that. If you had a suc, do you think it would be a valuable protection for the movince against bad times?—My objection to irrigation on a large scale is that there is fear of creating water-legging and of throwing land ont of authiration by saft efficie cence.
- 67. Q. Are the people rervous about this weler-logging?
  -No, it has always been recognized as likely to occur.
- 6S. Q. I suppose in these dry years they are rather in facour of \$1? Very much so.
- 69. Q. (Mr. Muir-Mackenzie)—Would kiaris or ricebeds succred lu water-logged places?—You would make water-logged areas smiling plains by the extension of rice cultivation, because rice being a semi-aquatic plant succeeds in such areas.
- 70. Q. You canst be very careful lest you spoil the prospects of these lands in years of short rainfall !—Yes.
- 71. Q. (The President)—I suppose you are an advected of drainage on lands that are water-logged?—Yes, drainage from the very nature of the case a said improve such lands; but it has lately come to our notice that in the case of an old drain in the Wagra thinks of the timeh District and the Janton drain of the Jambusar talmia of Broach the people are complaining that the "lith" or curface agricultural sails becoming impoverished. In Janton the people actually requested that the drain might not be repaired and improved, while this was being done as a famine-telief world. The porce of the water is said to wash away the surface soil, appoing inferior subsail.
- aposing interior audiant.

  72. Q. You have seen there famines, and are quite cognirant of the terrible loss to the country that has eccurred;
  suppleading you had reason to believe that there was going to
  less a famine in three years' time, what measures would you
  take to prepare the district to meet it!—The irrigation resources of finjarat have not been systematically investigated.
  I would advicate that aites should be found for tanks
  and wells, and boring apparatus provided. The berings
  should go a simultaneously.
- 73. Q. 16 you think there is store for the extension of tanks?—There are already perhaps 4,000 tanks in Gojarac

for irrigation and dricking porposes, and it is probable there are my more; these are all very old works, but we have done nothing to investigate further sites. By adding to the number of tanks, you would increase the rice cultivation of the lalukas, and the prosperity of the province.

- 74. Q. The measures you would take would be to make the province righer, and so betterable to stand the trial when it came; but small lanks would prahably be empty at such a time?—Yes, no doubt. I advicate wells also.
- 75. Q. Yon would not have an irrigation caunt?—With the exception of wells, probably no irrigation work wantd supply water during an netual tanine year. The Sabarmati canal would perhaps do a lot of good if it did not dry up.
- 76. Q. (Mr. Migham)—With reference to what you say about the digging of tanks, if any now ones were due would the people be willing to pay n water-rate?—Yes.
- 77. Q. Woold it be possible for land-owners to make new lanks themselves: if they made them there would be no water-rate to pay?—They have get no money.
- 78. Q. Suppose liberal advances were given !- Individual holdings are too small to make the owners join in a hig renture like that.
- 59. Q. I suppose water-mies are only paid when they take water ?—They have to be paid every year.
- So. Q. Suppose they do not take water?—They have to pay the rate all the same. If the people could get water till October, they would be willing to pay the rate.
- 81. Q What do you do in practice?—For the existing tanks we charge a councildated rate.
- 82. Q. What about now tanks ?-There are none.
- 83. Q. What is the difference between dry and wet rates per acre?—In Surat the whole rice assessment varies from 0 to 25 per acre, according to the capability of the soil and rice-heds.
- St. Q. Supposing you make new tanks, and bring land under rice cultivation that is at present under dry rate, what would be the increase in the rates ?—That will depend upon the quantity of water that you give and the month up to which you can give it; the enhancement will be from Rs. 2 to 5 per acre.
- 85. Q. If you charge a water-rate anir when water is taken, it would be much more ?--It may be its 7 per acre; the people would pay it willingly.
- 86. Q. The water-rate is not more than double ?-No.
- 87. Q. Then, if a man takes water once in two years, it would not matter which way it went?—No.
- 83. Q. They would take water every year?—Yes; very nearly.
- S9. Q. (Mr. Ibbetson)—However ample the rainfull?—Ter.
- 60. Q. (Mr. Higham)—You say no annual charge is required for repairs, but only periodical?—Yes.
- 91. Q. Da not the bunds require repairing ?-No.
- 92. Q Have not the times get bunds ?—Yes, they amply water by flow. But the bunds don't get broken and silk is put on them when the tank is cleared.
- 93. Q. (Mr. Muir Mackenzie)—Would not the cost of clearing the tanks be unselt greater than it would be, if they had not been neglected for so many years?—Yes, if there was a large amount of silt to be cleared, the cost would be very great; if it was cleared periodically, the cost would be only n few hundreda.
- 91. Q. (Mr. Higham)—Were not the tanks cleared during the last two findings?—The village tanks have not been teached during the last famine. They ought to be cleared, famine or na famine.
- 95. Q. What would be the expenditure on them?—I don't I now. Slace a ret assessment is paid they ought to be cleared.
- PG. Q. Is any record maintained of the money spent periodically on each tank f-It could be got from the Executive Engineer.
- 97. Q. Is there any expenditure incurred by the District Authoraties ?-Yes, on tanks for drinking purposes.
- 98. Q. Small tanks are not cleared at all by the P. W. D.?-No, that is, after the late Resolution.
- 93. Q. Has my reduction been made in the assessment on them by No, the Revision Survey was made, and the rice lands were re-succeed according to the capabilty of the tank.
  - 100. Q. When ?-During the last decade.

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- · 101. Q. Allowances would be made for the fact that a tank had silted up P—Yes, and for kiaris which did not receive tank water.
- 102. Q. What measures would you propose for clearing the small tanks; weald you put them in the hands of the Public Works Department?—There is no other agency to do it, the villagers would do it, but they have not the money.
- 103. Q. If the villagers got the money, would they do it?-It would require supervision.
- 104. Q. Could not the village headmen do it?—If a small number of meu were employed, they could, but not a large number.
- 105. Q. You would only require the Public Works Department to measure the small tanks, and then it could be given to the men to clear ?—Yes, that could be done.
- 106. Q. You have no Civil Agency to look after the work?—The Civil Officers might manage the small tanks through the villagers, but the l'ablic Works Department or the l'astrict Board Overseer would have to check the work.
- 107. Q. Money would be advanced by Government, and the District Sould would not come into it?—No, as accessment is charged on the tack, Government should pay for the repairs.
- 108. Q. The transactions would be dealt with hy the Civil Authorities and not by the District Board?—Yes, the District Board would have nothing to do with it.
- 109. Q. Have you any idea what expenditure would be required to put the small tanks in Gujarat into order ?- No.
- 110. Q. How many tanks are there which are not under the Public Works Department?—I cannot say, probably under a thousand.
- 111. Q. You say the people have no money; would it be a good thing to spend money on these tanks now for the sake of clearing them, and also to put a little money into the pockets of the villagers?—I think the tanks should be cleared, because they recure the rice crop, and the work would give employment in these hard times.
- 112. Q. In regard to tanke under the Public Works Department, are they kept in a proper state of repair?—There are no tanks in charge of the Public Works Prepartment, When repairs have to be done, the Collector aske the Public Works Department to make an estimate of the cost.
- 113. Q. The initiative is taken by the Civil Officers?— Yes; the Public Works Department have nothing to do with the tanks except to repair them.
- 114. Q. Are they ready to repair all the tanks if asked to ?--1 think they can't got fands; the hudget grant is limited, so the work is not done.
- 115. Q. The repairs of certain tanks may have to stand over ?-Yes,
- 116. Q. In regard to wells, what is the lift up to which people will work?—Onr Survey Department recognizes 40 feet as the ultimate depth to work profitably.
- 117. Q It would be no use to offer any encouragement for the construction of wells to lift more than that?—No.
- 118. Q. Supposing Government contributed the whole cost of making a well when you are more than 40 feet below the surface, would the people not work it after it was made?—
  It would not be profitable; and that sort of place is rare in Gujarat.
- 119. Q. Snpposing yon have wells at from 35 to 40 feet and the spring level fell in n year of drought to such an extent that they could not work it?—In one year of drought, the spring level would not fall much; in case of continued drought the spring level would fall from five to ten feet, but then they would work up to 50 feet if it were just to save a crop. But in a famino year, in addition to the water level heing low, the cattle would be too weak to work and the area irrigated would be small. In Kaira and other places, in the gorat tract, where the water is not deep there was a large area of fedder under irrigation. This year the wells are low and the water seanty.
- 120. Q. I enprose the level of the wells does not fall very much in a first year of famine?—No, it was not much affected in 1899.
- 121. Q. Can you give any idea of how much it was affected?—I don't think it was affected beyond five feet?
- 122. Q. And in the next year, I suppose it was lower?—

- 123. Q. And now?—Now the water is much lewer; it has been getting lewer and lower every year owing to the continuous drought.
- 124. Q. Some people talk about black soil and some about black cotton soil; is there any difference between the two ?—No, practically none.
- 125. Q. You have a certain amount of black soil in Kaira and the Panch Mahals?—Yes.
- 126. Q. The people don't grow octton but wheat on it?

  —The black soil lies low, so they grow wheat and not octton on it. It is too moist for cotton. In Ahmadabad they grow cotton.
- 127. Q. If they had plenty of water, they would grow rice instead, I suppose?—Yes.
- 128. Q. With regard to what you say about its being impossible to irrigate black soil under wells, because the water would run down the orevices in the dry weather; I could not irrigate when there is a failure of the late rainfall. Would not the crevices fill np directly the rain falls?—Yes; hut peeple are afraid of irrigating any erop except rice during a drought in the meason in black soil, as if rains come down on the top of irrigation the crop would be very much injured by excess of moistnre. That is the reason why people walt as long as they can before they apply to the Canal Authorities for irrigation water.
- 129. Q. Would you advocate potting wells down in black cotton soil?—If you want to spend money for the purpose of saving life it would do, but not for agricultural purposes. The well would not be used perhaps for 10 or 15 years.
  - 130. Q. It will never pay?-No, it will not pay.
- 131. Q. You say the distribution of water from the village tanks is controlled by the villagers thomselves. I suppose there is some record about the lands entitled to water?—Yes. There are sometimes disputes but not often except when there is scanty rainfail.
- 132. Q. If there is more water in the tank than they want, de they ever give it to land outside?—Yes, and a water-rate is charged.
  - 133. Q. Who gets.that?-Government.
- 131. Q. It rests with the proprietor to take it P-If no one requires the water, application is made to the village accountant for it.
- 135. Q. He squares the village accountant?—He cannot take it before the other people who have a right to the water have had their share.
- 136. Q Would the man have to put in a written application P-Ycs.
- 137. Q. Do the settlement records show for each village tank what is the area normally irrigated ?—The village accountant has got a statement that shows it.
- 138. Q. What does it show?—Practically the whole of the area which bears the tank himayat is irrigated every year. It shows the area on which the water assessment is put.
- 139. Q. Do you think that the rice area has diminished?
  -No.
- 140. Q. (Mr. Muir-Mackenzie)—Has the yield diminished P-Yer, owing to scanty rainfall.
- 141. Q. Have you any reason to suppose that the water received now is less than was estimated after the Revision Settlement was made?—Sufficient time has not passed to show if there is a difference on account of tanks silting up.
- 142. Q. (Mr. Higham)—You said that land-owners are willing to have tanks and get irrigation. You also said that the people wou't make tanks or undertake the repairs even if lot off the wet assessment. Does this mean that the cost of construction and maintaining tanks is more than the profits derived?—There must be a lot of places in Gajarat in which it would pay, supposing you could find the spots.
- 143. Q. Take it as a whole, if Government lays out money would it pay ?—It would not pay except in certain places.
- 144. Q. I understand the Topti Canal is considered undesirable, because it will irrigate the Broach district and irrigotion is not required there ?—Yes.
- 145. Q. What are the land-owners in Broach saying nbent it. Do they desire it ?—I have not talked to anybody about it. In fact the project is an old one and no discussion on it has taken place in recent years.
- 146. Q. There have been applications from people for a canal from the Sabarmati, but nothing of the kind from

French ?-There ore water-legged villages in Breach and the canal will do harm nod increase the water-logging.

- 147. Q. (Mr. Muir-Machenzie)—You have been lo England to the Royal Agricultural College and taken an agricultural diploma?—Yes.
- 148. Q. You have also had one of the Government Experimental Farms in the Decean under your charge?—
- [Mr. Muir-Mackenzie to President.—He is regarded as an efficient officer and a very good nuthority on such matters as soils, survey, and technical matters now under discus-
- sion.]

  149. Q. I sm anxious lo get an explanation regarding this question of rico assessment. You were asked the difference between the dry crop rate and the wet rate. Now, taking Borad, I find the dry crop rate at the last Revision bettlement trought an average of 4s. 5.4-11 per sere; the rate upon rice lands which existed from the original settlement brought out a rate of Rs. 7.8-9 per acre, the difference of Rs. 2.4-0 is the difference which you want. How much of this Rs. 2.4-0 would Government get, if they made a new tank?—This Rs. 7.8-9 represents the average assessment of rice; but the kiciris, bearing tank himayats, would be assessed higher, say about Bs. 12.
- 150. Q. The tank kiari rate would be Rs. 12 per acre and dry crop is Rs. 5-4-0. How much would be for akasia or rain water and how much for tank himsyat?—It will be about Rs. 31 each.
- 151. Q. In rice lands, Government would oberge both akasia and himayat?—No. Government would charge only dry crop rates plus himayat.
- 162. Q. If a man converts his dry crop land into rice lands by hunds, so as to hold rainfall, Government charges nuthing; but, if a tank is constructed which gives him water, Government will charge for the water Yes. In the revision Surrey Position class was charged instead of abasis in case of new rice, but as the field work is finally closed now, in cases of new rice on dry crop lands, no increased a sessment could be charged except for the use of the tank water. the tank water.
- 15?. Q. And the amount of that charge for the water will consist of the difference between what the rice land would have been assessed at, if it had been old rice land without himayat, and the fall charge with himayat?—It ought
- 151. Q. Taking this district again, we arrive at an average of its. 12 for tank-assisted rice?—Yes.
- 155 Q. And about Rs. 8 for unessisted rice: therefore, Government would charge Rs. 4 an acre for tank assistance. On the other hand, we have had no case in which such a thing has been done; no new tank has been made?—No.
- 156. Q. Now, as records this question of tank repair, the rates at the period settlement, which look place within the last decade, were fixed with reference to the state of repair of the tunks at that time?—Yes.
- 167. Q. Have yoo any reason to believe that the tanks have got into a very much worse state of repair since that date?—No.
- 158. Q. If Government now puts them into a thrrough state of repair, it will be giving the people the benefit of the tanks with better supplies than at the time the assessment was made?—Government is nuder an obligation to repair them: they have not spent money on the construction of the existing tanks: they charge water-rates, and ought to repair them in order to keep up the emply.
- repair ment in order to keep up the empty.

  169. Q. I understand you to say that the supply has not materially diminished since the time of the Revision Settlement?—Kn. If you had tanks you would add greatly to the prosperity of the villages. The Revised Settlement Survey was made during the last ten years, and all the tanks have been necessed. There have been no changes since them, and an material improvements. My reference is to the obligations of Government from the teginning—before the original cettlement.
- 160. Q. (Mr. Ibbelson imposing that at the last Revision Scattement, a tank was badly sized up and a low rate was put on the land in consequence; and if Government now clears out the tank and improves the supply of water, is there any way by which it can enhance the assessment during the currency of the cettlement?—No.
- 161. Q. (Mr. Muir-Mockenzie)—Is there nu power that Government reserves under the Land Revenue Acti-I believe Government nave no right to enhance the assess-

meet on kiaris bearing himsyat however much they Impeove the tank during the corrency of the existing settlement. They could not do so at the termination of the existing settlement. ment, because individual inquiry and subancement will not take place. In feture assessments, there will be only a general rise or fall of assessment, according to prices, &c.

162. Q. You talk of the obligations of Government. For the sake of meanment, I do not kay it is my opinion, I wish Io contend that Government is under no obligation, legal or meral, to repair these tanks. On what grounds do you consider that Government is under obligation to great them 2.—We charge higher rates for table. repair them ?-We charge higher rates for tanks, because people are supposed to onjoy a continued advantage; but they cannot continue to enjoy that advantage, unless the tanks are repaired. We charge a higher assessment; but we do not spend any maney on the tanks. As we charge a higher rate to the people for tanks. I think we are morally bound to see that a full sopply of water is made available.

163. Q. If a higher rate is charged on tanks, Government is bound to make the full supply nealiable for which the rate is charged, but we agreed just now that at the last Revision Settlement, the mount of supply that was available was estimated, and the rate charged was based upon that estimate?—If you take that stand-point, then you get out of the obligation.

164. Q. I want to come to a logical conclusion. Where has Government failed in doing what you consider part of its daty?—I say that Government has charged assessment for thirty years, and yet has never repaired the tanks.

- 165. Q. Are you golto sore that the tanks were not just as much silted up at the beginning of thirty years as they are now ?—No; but it is reasonable to believe se.
- they are now ?—No; but it is reasonable to believe so.

  168. Q. (Mr. Ibbetson)—Take the case where a tank was partly silted up, and suppose that the supply was vory insufficient and insecure, thet, in consequence, at the revision of sottlement, a low rate was put on the land; and suppose, then, that Government spends a considerable sum in clearing the tank; would you then revise the assessment and charge a higher rate, or would you still prevent Government from charging the higher rates?—I think we would have to be content with a low rate, unless the whole village is charged, and you put the village into a new group during the next revision; but a water-rate or lecreased assessment could be charged if the people agreed to pay it in consideration of the advantage they would derive from the repairs or extension of tanks.

  167. Q. You would put on the weter-rete ulthanch account.
- 167. Q. You would put on the weter-rete, although you are already charging wet assessment?—We could put on the water-rate per acre and then deduct the amount for wet assessment from the consolidated rate.
- 168. Q. You say that, if you make tanks, people will grow rice; then the construction of tanks is one of the best possible means of beloing the people if they can have practically unlimited rice cultivation?—Yes.
- 160. Q. A good many people seem to think that rice cultivation is inscoure !- I do not agree with that view; rice cultivation is less insecure than any other caltivation if protected by tanks.
- 170. Q. (The President)—About the Tspti and Nor. budda projects you say, "they will never pay, because people must keep a certain area of dry crops ?"-Yes.
  - 171. Q. Is that only because it is black soil ?-Yes.
- 172. Q. Why need they keep the area for dry crops Why should not they bright almost the whole of the area in the crops must come in rotation as the land is black.
- 173. Q. Why not irrigate folder?—My great objection to a cannl in these two talukas is particularly that it will waste certain valuable areas which now grow excellent dry crops. Fodder crops do not pay except near hig cities.
- 174. Q That is a very important point. Whereas up-country we irrigate with plenty of water nearly 75 per cent. of the area; here you seem not to eare for water except for rice erop !-Yes.
- 175. Q. Supposing there was plenty of water available apart from the black soil, why should not every field be rilgated?—The people do not want it.
- 176. Q. Why do they not want it f—In Gajarat they could grow valuable crops of juari and bajri without irrigation. In the mouseon the people would hold off and wait for rain in the fear that if rain foll after irrigation the crop would be more damaged then before.
- 177. Q. What about the wheat cropf-Wheat may be increased by irrigation.

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- 178. Q. Wheat is sawn on rice lands, I suppose?—No, very little; most of the wheat is grown on low-lying land on which moonsame crops cannot be grown. They do not irrigate wheat, except here and there in patches.
- 179. Q. Why not irrigate a large area of wheat. They do it op-country under country because other crops equally valuable are more easily grown without irrigation. Almost all wheat even grown in Gojarat is unirrigated.
  - 180. Q. It is grawn in wet soil !- Yes.
- 181. Q. (Mr. Ibbetson)—I thought that you said you had some irrigated wheat in the district?—Yes, in particular meas.
- 182. Q. (The Prevident)—That is only in black soil?—Yes, only on low lands.
- 183. Q. Would not higher lands like those of Kalm grow wheat !- They would.
  - 164. Q. Would it pay?-Yes, if irrigated under a canal.
- 195. Q. (Mr. Bbetson)—The question I want to clear up is this; if Government make tanks and canals would the water be used !—Yes.
- 186. Q. Do you think a canal wanld pay f-I suppose a canal would pay in the light soll of Mairn, at least the water would be utilized fully.
- 187. Q. You propose that taken i loans be refurned in more than ten or fitten instalments; how many do you propose?—Thirty to fifty, leaving it ut the option of the people to pay it scorer if they like.
- ISS. Q. How long does n well last ?-I think they go on everlatingly if repaired.
- 189. Q. Do they ever turn brackish?—Some of them do on the ren coast especually.
- 190. Q. In that ease you would remit the balance of the lean?—I would : it would encourage the people.
- 191. Q. Supposing a well costs lis. 509, and you have lis, 50 paid up in instalments after ten years, and then the well fails, and Government has to remit Rs. 450. Government would lose most of its money: the term seems too long!—If you want to promote well irrigation, I think the loss will have to be suffered.
  - 192. Q. Do you think it is worth while f-Tes.
- 193. Q. A great number of small tanks are silved up; they are so small that they are hardly worth the attention of the Public Works Department; and the Government does not propose to clear them, because they are so small?—Yes.
- 194. Q. Would it be advisable for the District Beards to take them in land, supposing there is no legal objection?—You may give them legal power to take oil anced assessment for cleaning the tanks. Why should not the towerment do it?
- 195. Q. Fecause they are too small to repay the cost of professional labour?—I think that would be better done by the village authornies; the Collectors and Assistant Collectors could manage that.
- 196. Q. You prefer that Government should do it directly through the Collectors and Assistant Collectors, rather than by the agency of the District Bonds P-Yes.
- 197. Q. Why should not the District Boards do it?—Practically a District Poard is a Collector.
- 198. Q. You say that it would be a good thing if Government were to make wells themselves, and then leave them to the cultivators?—Yes.
- 199. Q. You don't propose that wells in the land of an occupant should be made without the consent of the occupant?—No.
- 200. Q. Do you think the occupant would willingly allow Government to make a well in his land?—I think he woold be very much pleased to allow it.
- 201. Q. I'o you think a cultivator would not object to a lot of small Government officials coming on to his land and coming there coatinuously for some time ?—No.
- 202. Q. Do you think Government can dig a well as cheaply as oultivators can ?-Perhaps not.
- 203. Q. If Government dug a well and charged a waterrate, would it be objected to ?—They would pay for the water in a year in which they used it, but they would never consent to a permanent increased assessment.
- 201. Q. Well, if they object to the water-rate, then Government must recover their money by instalments ?-

- You may do so, but they would rather have that then a permanent increase in assessment.
- 205. Q. Suppose the villagers could build a well for Rs. 500, and suppose the Public Works Department builds it for Rs. 1,000. Government has to recover the Rs. 1,000 from the villagers, who will thus have to pay twice as much as if they had built the well thouselves for Rs. 500?—Yes.
- 206. Q. Whuld the cultivator pay at the rate fixed on for Rs. 1,000, when he can make a well himself for Rs. 500 P—Yes, in a year in which he could utilize the well.
- 207. Q. In how nonry years would be utilize the well—two in three or one in three?—In some places he could utilize it for three out of five years; in other tructs hardly ever.
- 208. Q. The cultivator would not, you think, approve of the scheme of Bovernmeet making the well?—Not, if you want him to pay for it.
- 200. Q. In fact, your view is that, if Government were to make wells regardless of expense and without recovering the cost, that it would be good for the cultivator F-Yes.
- 210. Q. In black cotton soil, it would not pay the cultivator to make a well F-No.
- 211. Q. Even, if a number of wells were made in black cotton soil, you believe they would practically be unused?—Yes.
- 212. Q. You are very much afraid of water-logging from caoals in black soil !- Yes.
  - 213. Q. And even from large tanks ?-Yes,
- 211. Q. Hare you ever known of water-logging in low-lying tracts?-Yes.
- 215. Q. Have you ever seen land water-logged by canal irrigation?—No, not in these parts. We have no canals except two small ones.
- 216. Q. You say that the people do not take advances for tanks, because they think that the Government is baund to clear them. Would they take advances to make new tanks?—No, the area commanded by each cultivator be very small; I do not think that a hundred or two hundred cultivators could be induced to join together to make a tank.
  - 217. Q. No co-operation is possible !- No.
- 218. Q. You say that Government should make small tanks where there are suitable sites; do you think; there would be many suitable sites; is any large extension of irrigation possible in this way?—Yes, Government our make tanks which will irrigate from five to fifty acres.
- 219. Q. Would they pry Government a reasonable return !-Yes.
- 220. Q. Do you think a very considerable extension is possible !- Yes.
  - 221. Q. Has any survey been made? -No.
  - 222. Q. No one knows where there sites are ?- No.
- 223. Q. Could not a survey be started P-Yes, for the purpose of a thorough Investigation of sites; they should also take up the question of burng.
- 224. Q. Have you ever known of unmanured soil being irrigated ?-No.
- 245. Q. Can you tell us what the result to the soil would be?—Without manure irrigation would not pay.
- 226. Q. We are told constantly that the great obstacle to successful irrigation is the want of a manura supply ?-I do not see why the supply should be limited
- 227. Q. If you had an unlimited supply of manure, it might pay?—I think manure will come when it is wanted. The ones under irrigation would increase grainally and sources of manure supply will increase in proportion.
- 223. Q. You cannot say what is the effect on the soil of irrigation without manure P-It would produce low class cereals and the soil would be impoverished.
- 229. Q. Do you speak from experience f-Yes, I have never heard anywhere that irrigation had injured the soil.
- 230. Q.—Have you ever heard of irrigation without manura !—In the Konkan rise is a cree, or very solden, manured; but the rain water must bring down silt from higher levels. Even in the Konkan fields receiving manure grow better crops than those that are neglected.
- 231. Q. You do not speak from experience?—No, I have never heard that irrigated crops are grown anywhore without the assistance of manure.

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- 252. Q. You think that there is great room for the extension of wells?—You may do a lot of good by extending wells in places like Charciar. It is a very fertile tract and has an industrious class of enlitrators. If Government apend money there, it will be a profitable investment. A lot of good could be denot there.
- 233. Q. (Mr. Rajaratna Mdlr.)—You say that, at the Revision Settlement, the areas fallen out of irrigation owing to silting of tanks were small?—They were insignificant.
- 231. Q. You also say that in fixing n low assessment at the Revision Government took into consideration the condi-tion in which the tanks were when they were token over by Government. How much lower was the assessment?—I do not think it was very much lower. The increase of assessment depends on the capacity of the tank and other factors auch as prices, &s., and not on the classification of land. Our classification is one thing and our assessment another.
- 235. Q. Can you give me an approximate idea of the loss 230. Q. Can you give me an inproximate tack of the loss of resenve to Government in coosequence of the had state of the tonks?—No. I doubt if it could be worked out. We never think of assessing water separately and land separately. Our estimated proportion of water-rate and soil-rate is not n true ratio.
- 236. Q. The poorer the seil, the better the adventage to the cultivator by means of irrigation from tanke?-Not in this part of the country.
- 237. Q. I simply want to know what revenue is eacrificed on account of the unsatisfactory condition of your tanks?—If the tanks had been kept to preper repair, the assessment would have been raised. For instance, in the Surat district, where the tank assessment is Rs 69,000, if the tanks bed been kept in proper repair, f fhink the assessment should perhaps have gone up at the revision settlement to Rs. 70,000; this, however, is simply o guess.
- 238. Q. Yon ear, "no remission is given on lands left uncultivated owing to iosufficiency of water supply." Is that the practice !—It has been the practice in these parts.
- 239.  $\bar{Q}$ . Are there rules for granting remission, when the supply fails i—No; it is not the custom.
- 240 Q. Thornies don't prohibit it?—There is no rule prohibiting it. I do not know of any rule which says remission should be given.
- 241. Q. Was no remission granted in the recent famine, even when the tanks gave out?—It was granted for the whole crop, and not for water-rate only.
- 242. Q. You say irrigated cotton does not pay as well as other agreed tural crops, have you undo any experiments?

  Not exactly; I think we did something of the surt; we experimented with cotton in the Khandesh district. Io the experimenced with cotton in the Abandesh district. Io the corat soil cotton grows in huge bash-e without producing much lint because this soil does not crack and dry up quickly as the black cotton soil.
- 213. Q. In four written answers you refer to the average area under irrigation. Is that area cropped a second or third time, or is only one crop taken?—One crop. What I mean is an average area irrigated in ordinary years.
- 214. Q. Is a record crop not taken from the same field ?-It may be, if the held is very strongly manured.
- 215. Q. Yesterday, we had a une evidence regarding paddy lands. How do you closs them in your settlement; at what rates do you assess them?—Rice lands are assessed according to the capacity of the heds to hold rain water, whether arrigable from a tunk or not, and the fertility of the soil.
- 216. Q. On what grounds is such a charge made if lands are turned into rice lands at the raym's cost? If new lands are turned into paddy lande, seek lands are charged as new rice on which the assessment is lower than that on the oldrice.
- 247. Q. Supposing the raynt gives up the cultivation of paddy, do you re-tran-fer it to faragut at the expiration of the suffement?—Yes.

- 213. Q. (Mr. Muir-Mackenzie)—You said there were Mr. P. R les for constructing new tanks; but I understand that Media. sites for constructing new tanks; but I understand that small tanks are found all over the Sarat district?—All over
- 249. Q. You don't mean merely bandhs?-No, tanks; though bandhs one very useful also.
- 250. Q (Mr. Ibbeston)—A bandh is a long bund across n klope or shallow draioage?—Ves. They exist in the Ahuadabad district, it has a peculiu form of cultivation ander them. In the mensoon the impounded water is let off in rice beloe on the other side of the bandh and in rabin excellent crops of wheat are grown in the ones where water was impounded during the mansoon.
- 231. Q. (Mr. Muir-Maclenzie)—There are in Virangaum and Ahmadnbad large number of bandhe doing metal
- 252. Q. You speak about the deopening of existing tunks or the making of new bands on the rites you have described; do you think that would be a good form of work in famino?—Yes.
- 253. Q. Here you any anggestions to make as to improveing the existing taken rales?-No. I have no direct cargetlen.
- 251. Q. Indirect; you have heard what the people say P-The distribution should be made by some responsible officer, and the leakage stopped.
- 255. Q. (Mr. Ibbetson)—At present who actuelly makes the distribution?—More or less the lists are prepared by Talatis, Mamletders, and Arni kerkmas. Such investigations as ore necessary ought to be made in every village by higher officers, who should see to everything the aren of land, the selection of people, &c. Money should be paid in installments as the work progresses.
- 250 Q. (Mr. Muir-Mackenzie)—How many kachcha wells are there?—In gorat tracts many kachcha wells were dug during the famine year.
- 257. Q. Are they valuable f-Thay are highly valuable for growing fodder.
- 258. Q. How early in the year ought one to knew whether famine ought to be expected ?—I think by the cud of October.
- 259. Q. Must you wait so long?—In Gujarat we do not get much min after Ostober. I think we must wait till we get the Deceals showers.
- 250. Q. Must you wait so long; would you not begin to baild kackeha walls at once ?—Yes; if the rains hold off you might begin carlier. A kacheha well would cost from Rs. 15 to Rs. 20, and would save valuable crops.
- 281. Q. Suppose there is a failure of the rainfull of a district by the end of September; would it be advisable to give advances at coce for kachcha welle?—Yes.
- 262. Q. You think the more wells made during a prosperous year, the better it would fortify the country ogainst famine I-Yes, that is so.
- 268 Q. Do you not think that the enlivators would be more inclined to take odvances from Government, if they had not to reply the principal but were made to pay an enhanced assessment?—I think they would consider that the worst form of repayment.
- 254. Q. Why?—Because somotimes they borrow only a portion of the money from Government; and if they grow a good crop, they repay the debt as soon as possible. An enhanced assessment would be a permanent clurks and a burden on their children. A man would rather do the thing himself or leave it ulone.
- 265 Q. He would not like the idea of un enhanced gressment !-- No.
- 266. Q. I sappose you are aware that n number of wells are made in the Notive Stotes on that principle !—Yes, but I do not consider comparisons of Native States with our teritories very sotisfactory. In Native States the rules regarding loans, &c. are not hard-and-feet; they are very clustic.

WITNESS No. 13 .- Mr. C. V. Veunon, I.C.S., Assistant Collector, Ahmadabad.

Answers to printed questions.

3. Brozeh.-I have only known the district since January 1890, and therefore cannot say whelher small tanks would hold water in seasons of average rainfall. Very many were dry to 1999.

I have seen high earthen dams made of such soil at Mr. C. F. Maturia, Dorn, Trykeri, etc., but nated that there is a greet tendency for large fissares to form after the iret heavy rain.

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I should sny that in the black cetten soil of Breach there is absolutely no demand for water for irrigation at any time except in seasons of drought. It is only in such seasons as 1899-1900 that the owners of black cetten soil think of irrigation and then chiefly us a means to tide ever the year, e.g., by raising fodder crops for their cattle. I believe tanks for irrigating such soil nro considered both parameters and animaering. unremunerative and unimportant.

- 6. Village and district irrigation works are, so far as I know, constructed by the Public Works Department in the Ahmadabad District. I doubt whether the responsibility of Government in connection with their maintenance after they have once been constructed and the rates fixed is at nll clearly defined. It is the case that rayats continue to pay for water advantages which no longer exist or in years in which no irrigation water is received. I have not heard of remissions being granted for any other reason than that the holder was absolutely unable to pay. District Boards repair irrigation tanks when these are also used for domestic and cattle-natering purposes; not, I believe, otherwise. District funds could not bear the burden unless extra revenue were assigned to them.
- I have known instances of irrigation tanks and bands instances where the landholder has sufficient capital, but in case of small heldings organization is difficult. There is a given for such purposes, but allotrents exceeding Rs. 1,000 are in practice extremely rare. The up-keep of all tanks and band irrigation works certainly requires greater attention. The daager in encouraging the construction of new works consists in the fact that it encourages the conversion of dry crop into rice land which experience has hitherto shown to be a very speculative so as to secure a tolerably certain supply of water, then this objection would disappear. The chief source of water-supply for cattle is at present tanks and these are very liable to run dry before the lot weather, the time when they are most needed. Drinking troughs atteched to wells then take their place; a systom which could secure a tank supply in the hot weather would be a boon. In Sanand very many irrigation tanks are also used for watering cattle. instances whore the landholder has sufficient capital, but in
- 7. In such talukas as Sanand wells are a profitable

2. In such taining as Sauand wells are a prolitable speculation in many parts, and even in the present year existing ones are largely in use.

In Vagra taluka, Bronch, where the sub-soil strata are largely salt. I believe a very large proportion of the wells constructed during the famine were failures.

8 Broach District.—The Bara tanets to the west of large transparent Program Broach Stratage.

Jambusar, Vagra and Broach talukas.

Jambisar, Yagra and Broach tellakas.

Water-logging has been a complaint for many years and many drainage channels were constructed both before and during the famine. More could be constructed with profit, but the up-keep of existing ones is still more important. They probably do not result in any immediate increase of revence, but might provent considerable loss in bnd seasons.

bnd seasons.

9. In Broach, north of Nathada, relief works consisted shiffly of large village tanks for watering proposes. The cost was wholly inconnuousurate with their utility. There were also drainage channels. One or two embanked road works were started, when the rains made tank work impossible. South of Narbada several irrigation tanks were ropaired and metal quarried for two important lines of road. Of the tanks constructed in 1899 some hold of road. Of the tanks constructed in 1899, some hold water (e.g., in Broach, Tenkari Sarbhan, Shigaon, A'med, Dabha) and some do not (e.g., in Broach, Dorn, Mataria i.e., in 1900-1901), and in Abmadahad, Shiawara (though a very large tank). Apparently the bottom takes some tims to settle, so that it is too early to speak with confidence. It seems certain that the process of siltation is often very rapid and that practically nothing is done to stop this, e g., in way of water-gates or siltation tanks.

#### II.

#### A. -General.

1. I have served in Ahmadabad, Surat, Dhárwar and Broach. The answers will relate mainly to Ahmadabad and Broach. In the former district I have held charge of

- Daskroi, Parantij and Medasa for a year (1897 May to 1898 May) and of Virumgam and Sanand for a few days. In the latter district 1 held charge of Vagra, Ankleshwar and Hanset from July to October 1900 (i.e., in the rains) and af Jamhusar, A'mod and Breach from February till August 1901
- 3. (4) In Bronch the black cotton soil (north of Nurbadda) is balloved to be unsuited for irrigation. It is also believed that irrigated cotton does not thrive. The experiment is rarely made. Rainfall rarely fails. In 1899-1900 mont is faroly made. Rainfall rarely latis. In 1899-1900 a considerable number of wells were constructed to raise (1) fodder crops, (2) such garden crops as onions. The soil, being full of cracks and holes, takes very much weter and except for years of utter drought the cost is probably incommensurate with the profit. In all ordinary years cotton occupies the soil for the greater part of the fair season. In Kall (Daskroi) I have this year seen a cotton crop irrigated from a well. from a well.
- (6) The initial expenditure is necessarily heavy for owners of small myatwari holdings and cannot be mot where that people are much in debt.
- (9) Lack of enterprise in making kacheha wells, eg., Koli cultivators. Lack of proper organization in constructing tanks and bunds by private enterprise.
- 4. So far as I know improvements are exempted from taxation during the period of the next Revision Survey (Section 107, Bombay Land Rovenac Code). As to whother distinction between "holdors'" and "tonsnts'" improvement is made I know nothing. I am of opinion that there sheald be no such distinction.

The provision of the law must be known to the people, but their view is likely to be affected by lie fact that (in Ahmadubad) revisions have usually meaut enhancements for other reasons.

- 5. Baforo the famine of 1899 the Ahmadabad cultivators (e.g., Parantij) were unwilling to take advance, because they thought the collection system would allow of no excepthey though the three that the famine (with the liberal advances of takayi and the remission of interest) has motorially altered their view, so that there are few who are not glad to get takayi. The difficulty new is (with the staff available) to distinguish the deserving cases quickly enough.
  - 5. (1) (2) (3) No, not in ordinary seasons
- (4) Is hardly passible, because the setual expenditure would be lard to entimate. Again it night set a premium on bad bandobast.
- (5) The period allowed by law is sufficient except where one famine or scarcity follows another.
- (6) In famino times part may be remitted (o.g., in rice tracts where there have been two or more successive faitures).
- 6. The people (in Sanand) have been very keen in the past on obtaining facilities for conversion of dry crep into rice land. The recent repeated failure of rice may check this.

#### D .- Tanks (Ahmadabad).

- 23. (1) Largely by rainfall, also by such irrigation channels no the Khari Cut supplying Chaudola Tauk (talaka Daskroi).
- (2) By channels where the level of the water is high enough; otherwise by jheels (e.g., taluka Sauand—Irriga-tion channel and bund in Mamkol village constructed by the owner of the village who is an Alunadabad Bania). Is Viramgum I have seen a case in which a double jheel was used, raising the water first to an artificial basin and theace to the required level.
- (3) (a) (b) (c) In years of drought and scanty minfall such sources are likely to fail. In years of mederate or ample rainfall they tide over the breaks and serve to keep the crop wet after the rainy season is over.
- 21. (1) I believe two crops are rarely, if over, grown one after the other in the same season on the same land.
- (2) Irrigated rice when it succeeds is believed to pay much better than dry crops.
- 26. When the tank gives out wells are sometimes ased, o.o., a lot of Kamed rice is now heing irrigated from kachela wells in the village of Upardal, taluka Sanand. I do not know whether there is much of this, but certainly it is wholly exceptional this year in Sanand, perhaps because the tank sapply was not sufficient in most cases even for sowing the crop.

- 29. The private owner has to construct lackcha channels to the source of supply and must also serround his land with a bood to keep the water in. In the hilly parts of Dhurwar the tank is often at a high lovel, and terraces of rice land one helow the other are constructed by the owners.
- 30. Tanks and bunds constructed by the Poblic Warks Department are osnally repaired by that Department often with the help of a contribution from the rayats. Disturble suppleys a special Engineer for the purpose. I do not know whether there is a proper system in Ahmadabad for keeping repairs up to date. On this point the Executive Engineer can give evidence.
- 32. In the case of poor Thinhdars and Inhuddre grantaio-aid or rigal advances might be given. In a village of
  the Karajei taluka of Dharnar I once negotiated a lean
  of Its. 2,000 to a big cultienter for construction of a rice
  tank. I renember rightly he had praviously received
  Rs. 2,000 for a similar purpose and was paying up promptly.
- 33. I can give no definite information but believe the sole tank does silt up in course of time. When the tank whole tank does silt up in course of time. When the tank is once filled, there should be some exstem for shutting off any further inrush of witer which would only bring in silt.

### E .- Wells (Ahmadabad and Brosch.)

- 31. (2) Experimental well- often turn out salt especially in such trusts as Viraughm (District Ahmadabad) and Vugra and Jambusar (District Breach) which are near the sea or a salt Rano.
- (3) Kackeha wells Rs. 5 and upwards; palla wells Rs. 250 and upwards.
  (5) By a leather water-backet hanging from a pulley and raised by a puir of bullocks.
- 1. Q. (The President.)—You are Assistant Collector, Ahmadabad ?—Yes, from 1896 to 1898 I have been Assistant Collector here.
- 2. Q. You have been As Dharwar and Broach?—Yes. Assistant Collector nt Sarat,
- S. Q. Where were you in famine ?- In Broach.
- 4. Q. Was the famme severe in that district ?- Yes,
- 5. Q. What do you think will be the best thing to do for this district in order to protect it sgainet famine?—Much need not be done for the reason that in n district like Broed scarcity and failure of rain is very uncommon; famino has occurred once in a century. The crops are very valuable in ordioery years, especially in Broach where cotton is grown. It would not be worth while endeavouring to cusure projection by irrigation schemes.
- 6. Q. Would they grow fodder by irrigation ?-The fodder question is a difficult one, they would grow fodder by irrigation if the sub-all water is good.
- 7. Q. Doyou see my way out of the difficulty !-- No, except fodder can be brought by railways from elsewhere.
- 8. Q. From where would you propose to bring it?-From the Central Provinces.
- 9. Q. Could you not grow it here; is there not sufficient land available?—There is very little waste land. In the famine of 1899 fodder did not grow, it dried on. We had only obout 5 inches of raio and fodder could not be grown.
- 10. Q. The best pointy for Government to pursue for a district like Breach where famine course only once in 50 or 160 years would be to relieve the distress when it comes!—
- 11. Q. Do you ndvocate drainage in your district?— Drainage channols are used in this district; n good many have been made since 1894; they were made both before and during the famine; but there are still water-logged areas in reveral talokes; they were mater-logged even for a considerable part of the season in 1900
- 12. Q. Are you aware of any objections being mised to the educating channels? I quite understand the objection in dry years?—I have not heard of any objections.
- 13. Q. Is there n feeling among the people that these drains should be made f-wound of them were made on the representations of the people. Last year white travelling through the Broach taluku I had two or three applications for eartain drains.
  - 14 Q. (Mr. Ibbetton.)-Did you say last year?-Xes-
- 15. Q. (The President.)—That was during the time of sear ity?—No, it was not in the year of searcity; it was after that.
  - 16. Q. Are they en a large traic?-No.

- 35 (1) I have not heard of two harvests being raised on the same land, but where rice has failed wheat has been ruised by means of a well (e.g., Kethal, tainks Sanand).
- (2) Wheat and rice are usually more valoable than dry
- crops.

  18) In years of scanty rainfall and drought wells are sometimes the coltivator's only stand-by.
- 38. (1) Great difficulties are eocoontered because the character of the sub-soil unter is so expricious. The people, however, soon learn where sweet water can be brid, and a kachcha well is not costly.
- (2) In the Broach District and in Sanand and Virsua gam of Ahmudabad I believe rock is rarely, if ever, encoau-tered. Sandy soil sometimes presents difficulties, as the well is likely to fall in. This difficulty is obviated by the construction of a circular wooden famon ork which is inserted below the level of the masonry.

Where kacheka wells can be made so cheaply I think boring tools are of little or no use, especially as the ordinary boring implements are very heavy and east a good deal to more and also are, I believe, hable to break it not skilledly mnnipalated.

40. Temporary Lucheha wells ure a good desl esed in parts of Sanaad and parts of Aledása. They cost very little and advances to construct them are of great use, though it is difficult to select the proper cases.

Acts.—The Government Resolution under reference was received by me late last night and was only read through lo-day. I have, therefore extremence from difficulty in pulling such expetience as I have beenly together. Most of my Ahmadabad experience was he as lirst year of district like. In Riconch there was famine and to Dharmat a very severe plague epidemic which engressed at alternion.

- 17. Q. Are they ten feet wide?-About that I thick,
- 18. Q. Do you know whether they were carried out as famino relief works?—Yes, some were.
- 19. Q. Are the people generally well off?-They are all in debt; though the crops are rich, the people are poor.
- 20. Q. You say here in reference to the Ahundahad people hefore the famine that "they were unwilling to take advances." Is that your experience in regard to take advances. I have only come back here recently.
- 21. Q. What was the case in Breach?—They elimoured for takavi, but not so much for wells.
- 22. Q. For cattle and seed?—Yes, the difficulty is that the applications all come in one month and are very difficolt to deside.
- 23. Q. Is there on increased domand for takevi for the construction of wells?—Yes, there is; a good many wells were constructed in Broach during the famine.
- 24. Q. Would people ruther take tukavi udvances or go to the souccar I 1 do not thank there is any unwillingness to take takuvi; but my experience is rather limited.
- 25 Q. (Mr. Muir-Mackenzic)—Before the famine very little takovs was asked for or given?—I know that before the fumine I tried to induce the people to take takovs, but they would not; they raid that Government would take it back when the instalment time came but that the success would wait; and therefore they would sooner have it from
- 26. Q. (The President.)—You mention to your second paper, paragraph 3, that "In Kah (Dastor) I have this year seen a cotton crop irrigated from a well." That must be a very peculiar elementance?—Since then in the western portion I have seen very many crops of cotton irrigated from wells. I asked the people and they said that it was not done in the pure black soil, but only in the yellow soil and when the rainfull was seanty. They said it had kept off rate.
- 27. Q. Have you seen irrigation from tanks of unything besides rice?-I do not think I have.
- 25. Q. In paragraph 26 you say "when the tank gives out, wells are sometimes used."—Yes.
- 29. Q You say kareal rice is grown by well irrigation?—Yes. In one particular village they grow 40 acres of kareal rice; it was irrigated from a tank—it was a fairly good tank—up to perhaps the end of September; when f got there I saw the well- irrigating it.
  - 30. Q. Do you know how deep the water was 3-No.
- 31. Q. It must have cost a great deal of labour?—This village is largely in the hands of a particular sourcer.
- 32. Q. Have you any present experience in regard to wells in rock buying failed?—There are no noths in the

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Mr. C. V. Broach district as far as I know. I have not heard of any difficulty of that kind.

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- 33. Q. (Mr. Higham.)—In regard to smull irrigation tanks you observe that the District Funds would not bear the burden unless extra revenue was assigned to them P.
  - 34. Q. Do you think that the District Board should be called upon to undertake the works and have extra revenue assigned to them or that Government should undertake to do it?-Better that Government should do it, and net the District Board.
  - 35. Q. Have the District Boards not the advantage of local knowledge?—I do not see that they have the advantage of local knowledge; Government have as much knowledge as the District Boards. In any case an Engineer, I suppeso, would have to carry out the work either for Government or for the Local District Boards.
  - 36. Q. It will have to he done by an Engineer?-I suppose so.
  - 37. Q. Havo the District Beards or Lecal Boards their -As far as I know the Local Boards have own Engineers ?only overseers; the Executivo Engineer looks after big schemes.
  - 38. Q. I nm speaking of small ones. Could the Collector undertake the work ?—He could do it, I suppose, Could the through Civil Agency, but he might need professional assistance.
  - 39. Q. If it is decided by the Engineer how much work is to be doue, could the Collector get it done by Civil Agency through the village headman?—I think he could do so but I cannot say; it would he well to have supervision by the Public Works Department to see that the thing is done,
  - 40. Q. Would it he difficult for the Revenue Officers to look after the work?—I think it would.
  - 41. Q. (Mr. Ibbetson.)—Are they going to open relief works in Broach this year?—I should think not; I think the district is fairly well off.
  - 42. Q. Suppose famine was to occur in Broach suddenly ero you prepared; have you had any surveys made?—I think the Executive Engineer has prepared schemes, which can be supplemented by works for the construction of small channels. I have had representations made to me by people here and there for these.
  - 43. Q. I suppose the Excoutive Engineer is generally in possession of information?—I really do not know.
  - 44. Q. Do you think it advisable to try the cultivation of rice on any large scele?—From my experience of this district I can say that the rice crops have failed hers for the last four years.
  - 45. Q. In fact the whole of your experience in India has been in bad years?—Yes; to some extent.
  - 46. Q. Was 1897 a bad year !- It was not a bad year, except for rice.
  - 47. Q. Did the rice full?—The rice crop was very poor; the other crops were fairly good.
  - 48. Q. At any rate the average has been fair to normal? -Yes, but I think it would be rather a risky speculation to turn more land into rice land in a conatry where the rainfall is always under 30 inohes.
  - 49. Q. Yon say "wells are n profitable speculation," are wells a profitable speculation in any large proportion in the Broach District?—No, I should not think so.
  - 50. In a small proportion?-Perhaps to the south of Broach, where it is more like Surat.
  - 51. Q. What proportion is that of the whole?-Abeut one-fourth, I should think; it may be more.
  - 52. Q. Is there room for the extension of wells ?-I do net know ; it is a difficult country.
  - 53. Q. You eay as regards the exemption of private improvements from enhanced assessments: "So far as I know improvements are exempted from taxetion daring the period of the next revision survey," Is that based upon actual knowledge of your own. Have you found that peopls have doubted that there will be exemption?—Perhaps it is rather hard to say.
    - 54. Q. You have no definite information ?-No.
  - 55. Q. You say as regards takavi "the difficulty new is (with the staff available) to distinguish the deserving cases quickly enough"?—I should like to qualify that. In the case of takavi the question is whether a man is solvent or

- 56. Q. Why?—He is to be paid au advance.
- 57. Q. Ho pledges bis land?—We must know how far it is mortgaged; or whether the land is his land.
- 58. Q. Is not the loan on the laud for irrigation the first charge ou the land?—Yes, it is; I believe there is some law that when taken is given the persons interested should be informed; I am not quite sure about that. My idea is that we should not defruid the earlier creditors.
- 59. Q. You do not defraud the earlier oreditors by taking the land as security !-- Well, one dees fool that
- 60. Q. Is that the strongest objection?—I do not know, I do not think it causes much delay; if a man has not got a mortgages in possession he would probably get his loan without much trouble.
- 61. Q. You say it would be herdly possible to remit an udvance made for digging a well in case the well fails, because the actual expenditure would be hard to estimate. Suppose a man digs a well and finds salt water, would you advocate remission of the advance?—The people know to a great extent the areas in which they can find water and those in which they cannot. Sometimes they make n well and find brackish water, which damages the land in the long way. I think Comment with the termit in that care loug run; I think Government might remit in that case.
- 62. Q. You don't think it should be always done? No.
- 63. Q. You say "where kachcha wells can be made so cheaply I think hering tools are of little or no use," do you mean boring with a drill f-Yos, a sort of a drill; it is n very heavy instrument.
- 64. Q. (Mr. Rajaraina Mdlr.)—In paragraph 8 of your first note you say "many drainage obasnols" were constructed both before and after the famine;" would the drainage channels cause loss of water in a bad season; would they drain away the water too feet?—Yes.
- 65. Q. (Mr. Ibbetson.)—A bad season would be a season of heavy reinfall ?-Yes, in some cases.
- 66 Q. (Mr. Rajuratna Mdlr.)—It may have the effect of heuefiting the crops in some cases ?—Yes.
- 67. Q. In your second nete, in paragraph 4, yen sey "the provision of the law must be known to the people, but thoir view is likely to be affected by the fact that (in Ahmadabed) revisions have usually meent enhancements for other reasons." What are the "other reasons" Is the enhancement very high, oemparatively !—It varies in different parts. In the Sanaud taluka it is about 30 per cent; not less.
- 68. Q. If there were no enhancement, do you think that wenld give a stimulus to the extension of well irriga-tion?—I do not think they are unwilling to build wells.
- 69. Q. In your second note you say "the period allowed hy law is sufficient, except where one famine or scarcity follows another?"—That is largely with reference to the graut of loans for wolls.
- 70. Q. What is the period allowed for the repayment of loans for agricultural purposes?—Two years for bullocks and seeds; that is the usual rule; it may be relaxed by Government.
- 71. Q. In paragraph 6 of the same note you say "the people (in Sanand) have been very keen in the pest on obtaining facilities for conversion of dry crops into rice land. The recent repeated failure of rice may check this." What is the "recent repeated failures"—A succession of failures of rice.
- 72. Q. (Mr. Muir-Mackenzie.)-Do you think that there is any kind of relief work, better than the repairing of roads or the constructing of new tanks, to be undertaken in times of famine?—I think there is no better form of relief work than irrigntion tanks.
- 73. Q. Large or small ?-Small would he the most nseful.
- 74. Q. I am talking of new tanks ?-Theu, I do not know.
- 75. Q. Do you think the multiplication of wells north of the Norhudda would add to the security of Broach against famine?—I do not think so.
- 76. Q. For the irrigation of cotton P-I do not think so ; they would not irrigate cotton at all.
- 77. Q. Not even in a famine year ?-It might be worth trying.
- 78. Q. You would advocate kachcha wells below tanks?

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- 79. Q. The multiplication of tanks would facilitate the construction of kuchcha wells?—It would; they would get water more easily than other wells.
- 80. Q. Have you seen a good many water-logged areas? —I have seen certain areas in Breach and Ankleshwar, in the Breach District, and some areas in Virangaum.
- 81. Q. Do you think any permanent improvement of these mens may be effected, so far as the normal seasons are concerved, by constructing drains?—I believe so.
  - S2. Q. You are inclined to approve of them f-Yes.

83. Q. Do you think that prior to the famine the Mr. C. V. objection of people to take taken was due to the rigidity Versan of the collection f—Yes.

81 Q. Do you think it would be any improvement if instead of giving taken in the ordinary way for wells. Government gure the rayet the whole money and charged him bagayat assessment?—It would have to be very earefully explained to the rayet.

85. Q. Would you advocate the sinking of trial shafts for wells by famine labour?—I am afraid not. The people know very well where they can get sweet water and where they can't.

WITNESS No. 14 .- A. E. L. EMANUEL, I.C.S., Assistant Collector, Ahmadabad.

Answers to printed questions.

I.

Point 4.—Besides the Sabarmati, other possible sources of irrigation are 1—

- (1) The tributaries of the Sabarmati in Modása and Pardutij talnkas, riz., from cast to west in order, the Watrak, Majham, Meshvo, Khari (mainly canadized), Hathmati (canadized already).
- (2) The Bokh rift and lakes in Parantij—already the subject of a large project.
- (3) Variona smaller streams, as the Dhamni and others in south Modáss, the Luni in Parántij, the Redh in Sasand and Dholka, streams at Upardal, Juhár and Derti in Sasand, at Ehekda, Kamlej and Khareda and elsewhere in Gogho, ot Walthera in Dholka, at Mandal in Viramgam.
- (4) Nallahs running into the Sabarmati and other rivers.

With the exception of the Meshya, middle and lower Khari, and greater Bokh lake, these sources all ran almost or quite dry in the famine, and therefore at another place I have stated that little water, except in the Sabarmati, ran to waste in the famice. However, in better years water could no doubt be retained.

I should perhaps hare added (5) a good deal of surface water running into the Nal salt lake in Yiramganm, Sasand and Dholka, which might be caught into tunks or otherwise held up.

In Modera (especially the corth), and in Gogha, roak and hard ground will offer some obstacles to irrigation, and in most of Modes the population is too wild to take much advantage of irrigation.

Point 7.—In the famine of 1859-1900 grants were made in each district for improving village water-supply. In my charge (Parántij and Alodéra) there were osed to deepen a good many village drinking wells, which has run quito or almost dry—with sneece—ful results.

Takavi was need to deepen irrigation wells. In Modé-a, however, many irrigation wells which ran dry were dug and blasted without reaching water. In spite of this, almost the only crops in Modésa were a few patches runnd the surriving wells, sometimes only one patch in a village. A few villages, thungh, had not a rood of crop.

Point S.—Much of Modáca Mahal east of Dhannars is a collection of small holes in which the water evidently loss in wet weather. The draioing of this would, I believe, fit a large tract for cultivation, but there is not at persent the lesst cult for land in that neighboorhood and the population is sparse and rude.

Many villages of Sansand and Dholkn, I remember, wed to complain of water-logging or of the entry to the village or some particular bottom being flooded annually. I think Siarsda in Dholka, and Knlava in Sansand are io tamoes. Near Bagodra in Dholka are rushy swamps which draining would make cultivable. One is marked 'Hatel lake' on the may another the 'Kala Nat'. The land is nlienated land.

The routh and east sides of Virangaum town are swampy, and draining them might improve the health of the place, not as Dholka and Ahmadabad have doubtless been improved by drainage ents.

Local and Municipal Funds could be used for the smaller of their works.

Possibly the braks of the Nal Itself might be drained for dry crops and the outline of the lake proper thus defined, in-tend of its shading off into ready wartes. Point 9.—I have often been told by villagers of Mr. A. I. I. little bits of work left undone or mischief caused in faming excavations. The Virangaum drains especially seem to have interfered with the Ireders of many village tanks. No doubt further nttention could dispose of these derangements. Sometimes the high drain banks seem to have held off sortiace water from neighbouring fields.

Some of the tanks due in the families are I believe and

Somn of the tasks dug in the famine are, I believe, most valuable improvements to irrigation, e.g., Butal ln Moden, bot many so far from being useful even as drinking and washing reservoirs, or air-refrigerators, seem ta have missed their supply, perhaps had too narrow an entry or one wrongly pleed, and dried up at an inexousably early date I might instance Vulnkad in Gouho and Gota in Deskroi. I believe many of the rillage works were in the hands of incompetent or iodifferent Sob-Overseers. bluices are, I believe, still wanted in many tanks.

II.

#### General.

- 1. My answers refor to the Ahmadshad District, with 7 out of the 8 tulukas of which I have become acquainted, as follows:—
  - 1898-89-Charge through the travelling season and into the famino of Sauand and Dholka talakas.
  - 1899-1900-Charge, throughout the famine, of Püran-
  - 1900-I'wo mouths' travelling in charge of Firam-
  - 1900-A few weeks' travelling over Gogla on Plagae duty.
  - 1897-1901.—Travelling about the bome, taluka Daskroi, occasionally fur various purposes
  - Ido not know the Dhandhuka taluka.
  - 3. (1) Nn.
  - (2) No.
  - (3) Possibly, for although manure is at a discount at most of the Municipalities, cattle-duog is the chief foel and is not easily carted over the lands of large villages.
- (4) This objection may hold in the black soil country of the Biai (in Dholka and Dhandhuka). In many paris irrigation will ecoko salt.
  - (b) No, except in so for as famines threaten.
  - (6) No doubt in many parts.
- (7) I do not think so now that there is a sob-soil asses-
- (9) The small holdings of the rayatwari system make against any such application of capital on a large scale amount irrigation implores.
- (9) Want of large holdlogs, espital and enterprise generally. I think possibly more than one Sabarmati canal might be dug in the Dholla taluka, utherwise oor much water is wasted in a famine year. Salt makes much water useless for irrigation.
- 4. I think the orsestment of sob-soil water, if proposly effected, a audicient inducement to irrigation as far as taxation is concerned.
- 5. Falsly freely, but not nearly so freely as they might to. I think cultivators light sky of indebting themselves to

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Mr. A. E. L. Government as they know they will have to pay one day,
Emanuel. whereas a 'sarkar' will not forcelose if he can help it.
However, Government could not think of adopting the savkar's method of high interest and should, I think, easo the burden by

- (2) remitting interest altogether, and giving the cultivator to understand that the principal is strictly returnable if not seener, then later. Government has no object in expecting a fiscal profit on the money laid out in takavi, and chould in this way try to beat the savkin.
- I think (4) would be a temptation to dishenest cultivators, who, if they do not know where water is, should be encouraged to find it in other ways than by land imprevemeat loans.

Grants-in-nid will not go far enough.

6. I found people in Sanand and Dholka constantly asking to have their irrigation tanks mouded and also to have large sloping areas of surface water held up by long bandhs .

The people of the Scharmati villages were very keen to have Mr. Pandit's river-side pump imitated when Government were pushing such a scheme.

7-22.

#### Tanks.

23. (1) I think nearly all the tanks of the district are very old. They have evidently been formed by—

- 1. Domming streams,
- 2. Letting an earthen wall across a patural depression or sloping area,
  - 3. Deepening swamps, or
- 4. Damming nallah by,

and fill themselves accordingly.

- A few, like Wasna Dhedhal, have had channels dug to fill thom.
- (2) The water is generally raised by a "dhekadi," or bag hung from a staging and distributed by "pats" among the fields to be watered. The principal "pat" may be banked up very high and with the help of stones, and sometimes has a sharp fall.
- (3) A tank should be full at, say, the end of Soptember, after which it lasts according to its shade, bottom and capacity for from five to 12 months, and this period is sbortened in proportion to the severity of a drought.
  - (4) Say 100 neres on the average.
  - 24-28.
- 29. Bosides making channels for the water the fields have to be smoothed and banked to hold the water. I believe the landlord usually prays for this, when there is one.
- 30 Most of the irrigation tanks proper are in the hands of the Public Works Department for repairs and up-keep, a few are 'village tanks,' and as snoh chargeable to the Local Board and Municipality. These three bodies excavate-silted up tanks as they can, with the help of village coatributions, which are asked for as a condition of repair wherever possible.

The result of the system possibly is that the villagers lose their sense of iesponsibility for the np-keep of the tank (though they might argue that they have to pay taxes and cesses), and will rather let a tank become nearly useless than give it my grutaitous labour. If the village would not take the place to do not its own tanks each description. would spate the labour to do up its own tanks each dry season, very few big job would be needed.

In Sanand and Dholka and elsewhere I heard constant complaints of Public Works tanks becoming useless for want of repair. The local funds recently have been prac-

I remember Mr. Gibb, Collector here, asking Goronment, I think successfully, to give up buying water-rate for lands irrigated from Public Works tanks nominally useful but really become quite insufficient.

Possibly something could be done in the direction of helping the villagers to work annually instead of letting a few tanks get into such a state that big excavation or mende are acceded at long intervals. "Recurring expenses" for tanks are unknown in Local Board budgets.

31. I only remember the one instance of a Knnbi, named Ambaram Punja, who got a concession from Governmout to train a snipe marsh at Sanand. Part of the water was to go to form a tauk. There was much local opposition, people saying they would be robbed of their water, or olse water-logged. They were quieted, and Ambaram was forced to make reasonable provision for

32. If a land-holder is sufficiently big, i.e., has enough land for it to be worth his while to make a tank, I think he should be given every encouragement; but n well should be better than a small tank, as it would generally tap the same supply and will conserve the water better, being underground. I think it would not be too great a concession to the hulder of a convicable tank to result him the to the builder of a serviceable tank to remit him the assess. ment of its area in return for a very moderate occupancy

33. I do not think they silt up very fast. Villagers are constantly asking for their tanke to be dug out becouse they get paid for the labour.

Silt is valued as a manure by the villagers and often taken for that parpose. Tanks are periodically dug on as mentioned in the answer to question 30.

#### Wells.

- 34 (1) Sanand and Dholka 50 feet, Parantij-30 feet.
- (2) Everywhere percelation is the usual source and springs are rare.
  - In Modden many of the wells falled in drought.
- In Virangaum and Dholka wells may go salt at any time with little warning, and very many of the wells are brackish. Round the 'Nul' lake the comparative freshness of the water-supply is cutirely dependent on the annual rains
  - (3) Bs. COO for a masonry well,
- (5) By staging, bullock pulley and leather bags. Oceasionally (ospecially in Viramgaum) a see-saw band-lift, with a lamp of mud as a weight at one end of the lever to counterbalance the water-bneket.
  - (6) Ten acres.
- 35. (1) Many a rain crop (e.g., 'makal') can be repeated in the winter by means of irrigation.
- (2) A cultivator will, if he can make a "kyardi" of his "jirayet" land, or some of it. He will do this for the sake of such a (in this district) speculative crop as rice.
- (3). (b) (c) A woll in a drought will supply the deficiencies of the rain barvest. This was universally the case this famine.
- 98. (1) In Sanand, Dholka and Viramgaum there is often creat difficulty, and many experiments have to be made in finding a place where a fresh water well can be found. Salt water can generally be found.

In Modása and some parts of Parantij the presouce of rock makes water-finding very precariously.

I think the Commissioner's present measures to encourage borings are the first in this district, and are still in progress. I think the lean of boring tools, blasting powder, etc., for experiments can do nothing but good.

The assignment of famine labour for shaft digging, which, I believe, was tried in the Decean, seems also unobjectionable, if properly supervised, but leans of takavi for patently experimental diggings are, I think, too unsafe in this district.

- 39. No. I think Government might as well plongb a entitivatore land for him and hand him over the proceeds. Porhaps the following plan might be feasible: for any good reason land might be tomporarily attached, a well dug is it, and the land returned to the same or another enlivator after expenses had been reconped from the irrigated crop.
- 40. The dry beds of tanks were let out on epecial terms during the fumine, and the rich had gave a good crop from temporary wells. In some villages these patches were the only oultivation.
- In Parantij where the sub-soil water of many villeges is only a few feet sown, temperary vells were dug in all directions and were of the numest value. They had a great tendency to fall in, the soil being eandy, bet could be boarded or bushed np.

In the same way many temporary wells appeared in river beds or river 'bhatha' laud.

A cheap rate for unassessed land irrigated in these ways and ready 'takuvi' for the work of construction are, I think, the best ways of encouraging temporary wells.

- 1. Q. (The President.)—You have been Assistant Collector of Ahmadabad since 1898 f—Yes.
- 2. Q. In paragraph 3, section 6, you say "No doubt in many parts." What do you nean exactly f-1 believe if you allow water to the whole neighbourhood, it will evoke salt in many parts.
- 3. Q. Is that your experience?—I cannot remember exactly where I got the idea from first.
- 4. Q. Do you think the construction of wells would be furthered if increased facilities were given for advances?

  —I think so, to a certain extent, but not much.
- 5. Q. Have you had any experience of giving advance of taken i P-Yes, especially at the close of the famine.
- 6. Q. What was the exact modus operandi?—The rillage officers sent up names of applicants which were tested; we had the whole rillage up en bloc, and gave out the money for seed.
- 7. Q. Were there special arrangements to give money very quickly !—Vez.
- 8. Q As regards wells, what would be the exact process?

  —A cultivator sends a petition; we send it to the Mandatder for inquiry through the lower officers, and according as they approve or not we give the money or withold it. The Assistant Collector uses the site if possible beforehond.
- p. Q. Would you encourage them to ask for takavi
- 10. Q. Do you suggest it to them or advi-e them to take it f-I often got the villagers together and suggested itto them. I told the Manulatdar to induce them to take takavi.
- 11. Q. How long does it take between a man'a sending an application and getting the grant?—That depends upon the officers. I should think a fortnight at least. You have to see before giving money whether the land is already encumbered.
- 12. Q. (Mr. Ibbetson.)—After what period does he get the money?—It would depend upon the energy of the subordinate officials.
- 19. Q. Would six months be abnormal? -Yes, that would be abnormal.
- 14. Q. Three months?—Three weeks or a mouth would be the usual time; inquiries as to encumbrances have to be made. It has been suggested that a man might be sent with rupees to give them on the spot.
- 16. Q. Is that ever done?—I do not think it is actually done; the Assistant Collector gives an order to pay at the local Transary.
- 16. Q. (Mr. Muir-Mackenzic)—That is still done? 1 think the latest system is that the Mamlaidar carries the cish with him?—That was at the end of the famioe when money was wanted quickly.
- 17. Q. (Mr. Ibbetson.)—That was for seeds and bullecles:—Yes.
- 18. Q. Are you sare that the takevi is paid through the taluka Troscury F-It is always done.
- 10. Q. (The President.)—You say "I found people in Sarand and Dholks constantly asking to have their irrigation tanks mended and also to have large sleping areas of surface water held up by long 'handhs." I do not suppose these "handhs" require great labour?—No; I do not think 50; they require to be put carefully in the proper place.
- 20. Q. I suppose a great number of Irrigating tanks were mended in the famine?—Not a great number.
- 21 Q. Yon say "the people of the Sabarmati villages were very been to have Mr. Pandit's river side pump imitated when Government were pushing such a scheme?" Mr. Pandit, t suppose, Indigot engines and pump?—Yes; from them be imigated about 200 acres; and in consequence of his success Government thought of preparing similar pumps.
  - 22. Q. He took the water from the river ?-Yes.
- 23 Q. Did he make any private arrangements with the cultivaters for pumping?—Yes.
- 24. Q You say the tanks are capable of irrigating only 160 screef-A great majority of them were small.
- 25. Q. Did they help stall during the famine : They must have; some of them helped the eattle, as finally the eattle had to be given water from boles in the tanks.
- 26. Q. Mr. Paulit pumpel up from wells in the river led f-Yes.

- 27. Q. You say "if the village would share the labour Mr. A. E. I to do up its own tanks each dry season, very few big joks Erranuel would be needed?"—Yes; but I do not know whether it would be right to expect the people to do this, since they pay water rates.
- 23. Q. In Sanand and Dholka you heard people complaining of the Public Works Department tanks becoming useless for want of repairs. The local funds recently have heen prasticulty "nil." Did you send up any case to Gevernment?—I wrote to the Executive Engineer, telling him that the people of such and such u village were complaining about the tanks being in disrepair, and generally I Immd that the reason for non-repairs was that the village contribution was awaited.
- 29. Q. If the people were anxious to get the tank repaired, were they not anxious to pay a part of the expenses?—I don't know.
- 30. Q. You say "if a landholder is sufficiently blg, i.e., has enough land for it to be worth his while to make a tank, I think he should be given every encouragement." Had you any cases of that kind?—I have mentioned the case of a man who reclaimed a large area and started irrigation. Ills name is Ambaram Punja.
- 31. Q. What is the Not Lake in Viranganm?-It is a salt lake.
- 32 Q. (Mr. Ibbetsen )—Do the people collect salt from it? -No.
- 83. Q. (The President.) -ls It a large lake f-Yes; it is a natural depression, ten miles long.
- 31. Q. You say elx neres is the average area commended by a well?—Yes, I think so.
- 35. Q. The six acres could be irrigated at the same time? -I think so.
- 36. Q. (Mr. Muir-Mackenzie.) How many kos f An average well usually has two Los.
- 37. Q. Not more than three acres to each kesf-No, I think not.
- 35. Q. (The President)—In your second paragraph you say "In the famine of 1899-1900 grants were made in each district for improving village water-supply. In my charge (Parantij and Modasa) these were used to deepen a good many village drinking wells, which had run quite or almost dry, with successful results." How are the wells deepened?—Men were sent down to clear out the accumulations.
- 39. Q. (Mr Ibbetson.)—They did not sink them deeper —I do not think so.
- 40~Q. They only cleared them  $\mbox{\it P}{--}\mbox{\it Yes}$  ; and  $\mbox{\it j}$  erhaps they dug them deeper.
- 41. Q. (The President.)—What do you think is the best form of protection for a district such as Ahmadubad against the encroachment of another famino?—I agree with Mr. Mehto's idea that irrigational surveys should be made and tanks constructed on favourable sites, but wells hold water longer.
- 42. Q You don't knew the Khari scheme f-I don't know it, but I know the country through which the Khari Canal goes.
- 43 Q. (Mr. Higham.)—You say in your note, "these three hodies excavate silted up tanks as they can, with the help of village contributions which are neked far as a condition of repair wherever possible.' Are the villagers supposed to contribute to the eleannee of their tanks: —Preference is given to the villagers who do make such contributions.
- 41. Q. Is there any rule about it ?-I think there is a Local Board rule and a povernment Resolution.
- 45. Q. Lecal Boards only clear nut tanks which are used for drinking !-- Yes.
- 48. Q. They do not clear out injection tauls !- Possibly they do clear some of the small tauks used for irrigation.
- tion.

  47. Q. If any revenue is carned on a tank, it would not be cleared by the Local Boards !—As a rule, such tanks would be carled Public Works Department tanks.
- 48. Q And these Public Warks Department tanks the Poblic Works Department don't take in hand unless the villagers are ready to confribute?—I think they generally wait for that.
- 49. Q. They give preference to those who contribute?
- -Yes.

  50. Q. Did the Public Works Deportment dig out tanks to any large extent before the familie of 1899 8-No.

51. Q. It was deferred for want of money and want of Bodget sauction?—The reason was that the people did not or would not contribute their share. Mr. A E L. Emanuel.

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- 52. Q. What chere ?-I do not know exactly.
- 53. Q. You say the villagers ask to be allowed to repair the tanks, but they want to be paid for their lahour? Yes ; eince the famine.
- 54. Q. They want to get money?—Yes, and they like to get labour in their own villages.
- 55. Q. I do not quite understand what you mean by assessment of sub-soil water ?—In the Revenue Settlement in certain talukee icetesd of charging anythicg extra on account of wells the land is charged according to the amount of water supposed to exist under the sub-seil whether there is n well or not.
- 56. Q. How do you measure the quantity of water under the sub-soil?—Trial borings nro made, and it is generally known where water can he obtained.
- 57. Q. (Mr. Ibotson.)—You sey takevi cannot be given without making inquiries as to the escurity. Why should that be necessary when you have the land?—You cannot be sure that the land is not already encumbered.
- 58. Q. Is not the Government loan a first charge on the land ?—Yes.
- 59. Q. Then the enonmbrance does not matter?-No. I supposo not.
- 60. Q. Is not delay a great factor in preventing people from applying for takavi?—I think dolay tells a good deal.
- 61. Q. I notice that some of the witnesses say that inquiries have to be made as to the man'e edvency?-
- 62. Q. Is that tree ?-Yes; sometimes his land is worthless.
- 63. Q. There must be many parts of the country where you know that the land is a sufficient security without any inquiries?—If you do not happen to be on the spot, you must make inquiries as to the mau's solvency.
- 64. Q. Speaking of making people repair their tauks you onite agree with Mr. Mehts that it would be hopeless to get them to dig tanks? You say "villagers are constantly asking for their tanks to be dug out because they get paid for their labour?"—Yes.
- 65. Q. Mr. Mehta said they would expect Government to dear them for them and so let the tanks go absolutely into disrepair ?—I helieve there is much truth in that.
- 66. Q. Do yoo know why the villagers are made liable for 10 per cent. of contribution when they are alreedy assessed for the water they get from the tanks ?—I do not
- 67. Q. If they do not pay the 10 per cent., they do not get their work done?—I do not know.
- 68. Q You do not suppose, at any rate, that the work is done for them if the 10 per cent. has not been paid?—I think the Public Worke Department try to get the 10 per cent.
- 69. Q. Yoo say you do not think that fear of future enhancement would prevent men extending irrigation now that there is a sub-soil assessment. I do not quite understand you?—I think I made a mistake there.
- 70. Q. You say again that "assessment of sub-soil water, if properly effected, is a sufficient inducement to irrigation as far as taxation is concerned." How is there inducement to irrigate ?-If n man uses cub-soil water below hie well, he

gets the advantage without having to pay anything more.
71. Q. He has got to pay the assessment whather he makes a well or not ?—Yes.

- 72. Q. I suppose you do not know anything about the way in which these things are actually worked ?—No.
  - 73. Q. You have no practical experience !- No.
- 74. Q. Are there any rules under which a Collector can ahetain from recovering all the instalments of takavi in a bad year. Supposing a well goes wrong or crops fail?

  —As far as I know the rules, the Collector has power to suspend recovery of instalments in times of famine.
- 75. Q. Do you know of any rule which empowers the Collector to do so except in times of famine ?—I do not remember anv.
- 76. Q. Have you powers to moderate the rigidity of recovery ?—I have had petitions to abstain from recover-

- ing instalments and I think they have been accepted. I remember some inetances in which this was done.
- 77. Q. You say you would remit the interest on advances for welle?—I think so, if Government has no objec-
- 78. Q. Government has to berrow the monsy and it will have to bear the less if it remits?—It does not berrow.
- 79. Q. It berrows enormons snms every day. Do you think it would be worth Government's while, as a protective measure, to give takavi in Ahmadabal and Breach free of interest?—I do not think so. [I think so now, for wells. (May 1902.)]
- 80. Q. Would the result he worth the less of money? No. I do not think it would. [I now think it would. (May 1902.)]
- 81. Q. You say that remission of advances in case of wells will be a temptation to dishonest cultivators. Why is that?—It would be a sort of gamble at the Government expanse.
  - 82. Q. They would become more epsenlative?-Yes.
- 83. Q. Suppose Government only remitted its advacce in casse where wells have gone wrong; do you think any provision of think sort would remove your objection to the remission of takavi?—I think then there would be no objection.
- 84. Q. You say "I found people in Sanand and Dhelka constantly asking to have their irrigation tanks mended and also to have large sloping areas of surface water hald up by long bunds," these bunds could be easily made by themselves !—Yee; they would have to combine combine.
- 85. Q. Would it be quite impossible or hopolese as far as you know to get people to combine for work of that sort?—I don't think they will work without boing paid.
- 86. Q. Do they make small tanks?—They do make them within their own fields.
- 87. Q. Anything that would irrigate 200 acres ?-I de not remember any so large as thet.
- 88. Q. Do you think they could be induced to build tanks by grants-in-aid?—No.
- 89. Q. Would it not be possible for I coal Boards to dig tanks and keep them in repair?—I don't think they can ever de more than one or two a year.
  - 90. Q. Thet is for wast of funde?-Yes.
- 91. Q. You say "the cultivator is responsible for these tanks, make him an allotment and get him to do the work;" euppose the Local Boards were made an allotment, do you think the work would be done?—I think so.
- 92. Q. Do the Local Boards keep up drinking tanke?
- 93. Q. There is no reason why the Local Boards should not manage a very great number of small tanks?-No.
- 94. Q. De you see any objection to that ?-I think they do it at present.
- 95. Q. If a man makes a tank and speads money on it Government pute an extra assessment on the land; suppose the Local Boards were to make these tanke, would it be reasonable for Government to give them a portion of the enhanced assessment ?-Yes.
- 96. Q. Government could do the big works and allow the Local Boards to attend to the small works?—Yes, I think so.
- 97. Q. Your experience of Local Boards is that something of the kind may be done? - Yee; in good years the tanks would make a good return, in had years they would lose nothing. The distinctions between the Local Board tanks and the Public Works Department tanks are arhi-
- 98. Q. You say "a well in a drought will supply the deficiencies of the rain barvest," and you say also that welle fail in their supply—I do not see how you reconcile the two things; do wells generally fail in drought?—Not the
- 99. Q. Generally the wells were of great assistance during the famine  $\ell\!=\!\!\mathrm{Yes}.$
- 100. Q. (Mr. Rajaratna Mair.)—Could yoo tell ns what are first and what second class works ?—I am afraid I do not know.

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- 101. Q. Do yan think it fair to call upon the cultivators to contribute 10 per cent, of the cost of repairs, more especially considering that the assessment is not remitted even in seasons of drought?—It does not reem fair.
- 102. Q. In case a tank is constructed by a prirate individual you remit the entire water rate and charge bim only inrayet rate?—I think so.
- 103. Q. Land irrigated under the tank is not liable under the present rules to pay any water advantage rate?

  I think there is a special contract made in that case.
- 101. Q. I think what you mean by sub-soil assessment is assessment on land according to the depth of water?—Na, according to the water facilities.
- 105. Q. Suppose and well is due by the rayat and water is found at 20 feet depth and another at 40 feet depth, what would be the sub-soil rate?—The sub-soil rate would be fixed before the well was dag.
- 108. Q. And after the well is dug?-The rate remains the same
- 305. Q. Then what is the meaning of calling it a sub-soil rate?—Formerly the rate used to be charged on wells; but now the well is not considered at all and simply the projects in the land is considered whether it is suitable for a well
  - 108. Q. What is a riversido pump?-A steam pump-
- 109. Q. Has it been successful !- I think it is a great
- 110. Q. What is the cost per acre irrigated ?- I do not
- 111. Q. Do you know what is the cost of boring tools?—I am ufraid I do not know.
- 112. Q. Are myats willing to take loans for these boring tools?—It has only just been tried, and I do not know the result.
- 113. Q Do you think thoy pay for the services of men omployed P—I do not thick they have men at present.

  114. Q. In paragraph 39 you say "for any good reason had might be temporarily attached." Under what condition would you attach the lond P—For arrears af revende.
- 116. Q. You say "the insufficient supply of manure is without doubt the main obstacle to irrigation." Do the rayats use green leaves from the farests around for purposes of manure?—I have never beard of it.
- 116. Q. Who measures the land brigated under the canals and other irrigation works in the Ahmadabad district, is it done by the Public Works Department or the Irrigatingation Department ?—I don't know.
- 117. Q. (Mr. Muir-Mackenzie.)—Do you think that were advances made to a villager or to a number of people an their joint responsibility for the construction of tanks they would be able to make small tanks, irrigating sof 20 to 30 acres?—I think they might.
- 118. Q. You have nover had such applications?-No. not for new tanks.

- 119. Q. Have you deared old tanks ?-Very constantly. Mr. A. L. L.
- 120. Q. Are you aware that the sub-soil water is deter- I'm inucl. mined with reference in the sub-and water level f—I think it is also determined with reference to the quality of water.
  - 191. Q. The water level is and of the points !- Yes.
- 122. Q. Soppose a village is surveyed regarding the water lovel and aweetness of the water and the saline characteristics of the soil, would you have the data necessary to determine whether it is odvisable to sink a well?—Yes, I think so.
- 193. Q. What kind of works do you propose to start for famino labour-wells or tanks f-I think it depends upon the locality.
- 121. Q. Are there any localities in your charge which require tanks ?-- Very for.
- 125. Q. Do you mean that very few places have been faund where new tanks could be made for rice sultivation?—
  1 would not like to say that.
- 126~Q. You never get applications from people for these tanks ?—Never.
- 127. Q. And for lone bunds—have you ever had applications for these?—Yes, I have in regard to those.
- 128. Q. They make a very good form of rellef work?— Yes; better than roads, but I do not think that in many parts of the district they could make bunds; they could be made only in one corner.
- 180. Q. Are you in favour of granting large advances when famine threatens, for digging kacheha wells?—You, the people have been taught a serore lesson by the lost famine.
- 131. Q. Do you think these wells were a success !—They were very useful.
- 132. Q. Probably for fadder?—And also far grain crops; the sub-soil water is very high.
- 133. Q. (Mr. Ibbetson.) Of what district are you speaking ? The Parantij taluka of this district.
- 134. Q. Is that your charge !- I was there doring the famine.
- 135. Q. Then you have specific knowledge?—Yes happen to know the place well.
- 136. Q. There, these wells are used?—Yes, because the water is so high.
- 137. Q. (Mr. Muir-Mackenzie)—If it is ascertained heforehand whether the water level is very high, it would be advisable in famine times to at once place large smus at the world of the woods and since days. oe navisacie in inmino times to at once place large sams at the disposal of the people and give advances for digging kachcha wells?—I do not think there would be many other areas suitable for kachcha wells.

# SIXTEENTH DAY.

# Ahmadabad, 4th December 1901.

WITKESS No. 15, ME. F. G. PRATT, I.C.S., Collector of Ahmadabad.

Answers to printed questions.

#### GUILRAT.

#### 1. Ahmadabad District .-

Acres-Gross area . 2.192.190 • 1,723,860 Culturable area . . . . The proportion of the culturable area protested by Government Irrigation Works The proportion of the culturable area pro--2 tected by wells . The proportion of the culturable area protected by private or village works - 3

2. Character of the soil.—There are two main arieties of soil: 'goradu' and black cotton soil. The

commonest soil is the gorads or sandy light coloured alluvial soil. This varies extremely in fortility, principally from the presence of sand in greater or less proportion, from being capable of prodocing anly scanty crops of the commonest cereals to a degree of productive power probably unsurpassed by soil in any part of India. It differs from the kali or black cotton soil especially in its power of retaining moistine being far inferior, and thus almost all the creps which are mised in it without artificial irrigation are kharif and reaped inmediately after the moneon. It requires not of frequent and copious manuring to prevent its productive power from being calmosted.

\*\*Rical cattan soil is also found over large areas of the

Black cotton soil is also found over large areas of the Mace extent for the aid took wheat. It is intrinsically more valuable than garned soil, or it requits its own strength with merely the aid of rain and atmospheric air it does not stand in need of regular manuring and is much more retentive of moisture.

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- 3. Ordinarily there is but little demand for water in Gujarat during the senth-west menseen. But one exception to this general statement must be made in the case of the rice lands. It is chvious that rice cultivation with an average rainful of about 30 inches must be nt all times more or less presented and speculative. If the distribution of the rainful is at all irregular, the crop must suffer nuless assisted by artificial irrigation, and the frequently recurring failures of the later menseen rains in September are a frequent cause of the failure of the crop.
  - 4. Ahmadabad District.—Total area irrigated by wells—
    - (a) In ordinary years 44,100 acres. This is the average of the four years (1895-96 to 1898-99).
    - (b) In years of drought (1899-1900)-92,445 peres.

Number of now wells constructed annually during the last five years is as fullows:—

			Tor	'AL	•	2,610
1909-1901.	•	•	•	4	•	512
1899-1900.	•	•	•	•	•	1,915
1898-1899.	•	٠	•	•	•	63
1897-1808.	•	•	•	•	•	65
1896-1697.	•	•	•	•	•	õõ
						Rs.

But these figures cannot he accepted as reliable or authonitative as they have been collected in a hurry from the various talukas of the district, and it is doubtful if the figures of kachcha wells have been given in all case.

figures of kachcha wells have been given in all cases.

5. The extent to which construction of wells has been assisted in the Abmadahad District by advances from Government is shown in the sub-joined table:—

						iniount of Advance.
						$\mathbb{R}_{5}$ .
1890-1891.						7,775
1891-1892.	•	•	•	•	•	8,400
1892-1893.	•	•	•		•	850
1693-1694.				•		275
1894-1895 .		•	•	•		4,575
1895-189G.		•		•		9,205
1896-1897			•	• •	•	3,005
1897-1898 .		•	•	•		2,110
1698-1899.				•	,	1,635
1899-1±00.					. 1	1,41,303

In recent years the concession has been made to wellconstructors of a guarantee against any increase of assessment on account of the improvement of the land effected by the construction of the well.

## II. A.—General.

- 1. The answers below written are based upon my experience uf the Kaira District and of portions of the Ahmadahad District.
- Ahmadahad District.

  2. The average rainfall in the Ahmadahad District in the years from 1870 to 1878 was 32'13 inches. "The rainy season generally begins in the latter part of June, expends its greatest strength in July and gradually loses furce till its elose about the end of September" (Ahmadahad Gazetteer). I am numble to give mouthly averages, but rain at any time except the four months' (June—September) period is rare and not to he canned un.
- 3. I know of no obstacles to the extension of irrigation arising from any of the causes classified under heads (1), (4), (7), (6) or (9).

Head No. 2—In the districts of Gujarat owing to the large destruction by fumine of agricultural cattle it is possible that this obstacle may prevent any great extension of well-irrigation: but at the same time I think that few of the useful well-cattle were allowed by their unwars to perish, and the cattle that died are being replaced year after year hy private enterprise and by the help of Government takavi advances.

The insufficient supply of manure (head No. 3) is without doubt the main obstacle to the crtension of irrigation: and this is the reason which is most commonly assigned by the people themselves. The surplus of manure is only

sufficient for a limited area in the home fields near the village site. These hems fields are naturally the first to be irrigated, because they are the most accessible for labour and supervision, hesides heing probably of a hetter quality of soil originally. Lack of capital for the initial expanditure (head No. 6) doubtless operates to some extent to provent the extension of irrigation. Thus a cultivator of one of the backward classes, e.g., a Koli or Dhurla, would not find it easy to find the capital for sinking a well or the fundator carrying on the culture of irrigated crops. But lack of enterprise would in most cases prevent among such classes even the desire for improved cultivation, for in a normal season the cultivator would without irrigation raiss a crup which would amply suffice for his maintenance.

- 4. Land which is irrigated from wells ur other works constructed by private capital is permanently exempted from enhancement of assessment on account of the irrigation. Thus land, which during a term of survey settlement may have been converted from dry orop land to garden land would on the introduction of a revision survey continue to pay the dry crop rate. I consider that the existing provisions in this respect are sufficiently liberal.
- 5. Leans under the Land Improvement Act are now being taken freely in Gujarat; their popularity has enormously increased owing to the familie and the scarcity of the last two seasons.

I see no reason for recommending-

- (1) reduction of the rate of interest; or
- (2) remission of the interest; or
- (3) partial remission of the advance; or
- (5) extension of the peroid for repayment; or
- (6) grants-in-aid.

I would recommend, in the case of failure of the attempt to obtain water, total remission of the amount ascertained to have been actually expended. I am of opinion that the existing conditions under which such loans are made are quite liberal enough, and I fully endorse the views of the effect that the success in the administration of the Act depends upon men, not measures.

6. I cannot answer the first half of this question. No such case has ever come to my notice. In a portion of this district, viz., the South Daskrei tract and the adjacent Daskrei tract of the Kaira District, where rice is the principal crop, there is a strong desire that this crop should be secured by a supply of canal water in the latter partion of the monsoon. The crop frequently fails altegether or is severely affected for want of rain at the end of the monsoon, and a cannl supplying water in September would be an immense hoon in such tracts. Complaints of the deficiency and suggestions as to the moans of supplying it are frequently made by the oultivators themselves.

#### D .- Tanks.

- 23. (1) The tanks in the Ahmadahad and Kaira Districts are supplied with water by the mensoon rain and in the majurity of cases have little ur no catchment urea. The number of tanks whose water can be made available for irrigation hears but a small proportion to the whole.
- (2) The water is distributed to the land in a few cases by direct flow and in the great majority of eases by lift, the water being lifted hy manual power or hy hallocks from one pit to another up the incline until it has been brought above the level of the fields which it is intended to irrigate.
- (3) I cannot asswer with certainty on this paint, having only known the Ahmadahad and Kaira Districts in seasons of drought or senity rainfall: but I believe that even in normal seasons the tank water-supply is rarely available for rahi crops.
- (4) The area irrigated varies with the size and nature of the tank. The maximum area irrigable would, I think, be perhaps 250 acres from an ordinary village tank: the average would perhaps be about 50 acres: but I am not nt nll sure of these figures.
- 24. (a) In a year of ample rainfall tauk-irrigation would undoubtedly render it possible to enlivate two harvests instead of one; but little use of the tank water having been necessary for the kharif rice crop, the surplus would be available and would be used for radicalitical, wheat or harley ar grain.

The supply in tanks being nearly always dependent on the monsoon and therefore being uncertain, it appears to me that tank-irrigation could not have the effect of leading

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to a permanent substitution of a more valuable crop or variety, e.g., Kamod rice for Sutareal rice (Kamod is about 25 per cent, more valuable).

(b) In a year of scauty rainfall, i.e., scauty towards the end of the mensoon, the valoe of irrigation tanks properly kept up may be estimated by a consideration of the following extracts from the revision Sarvey Blue Book of the Dholka Talula of the Ahmadabad District.

Captain Wingste, Reseaue Survey Commissioner, wrote in 1853:-

"The rice lands are for the most part dependent on tanks which are quite dry in the hot weather, and unless the rains fall sufficiently in the early part of the moneoco to fill them and to enable the cultivators to sew the nursery beds from which the young rice plants are sub-equently transplanted into the fields, rice crops cannot be raised at all. Ample falls of rain later in the senson though sufficient to sill the tanks are of no avail, and as the rarry fall is very uncertain, it is quite a common occurrence for the centire rice lands of a village to be left waste, so common indeed as to be a characteristic feature of the agriculture of the district. In illustration of this I may mention that out of the server villages experimentally settled by as last season the rice lands of two, Itanesar and Degamma, were left entirely uncultivated, though Degamma is one of the finest rice villages in the district. This cril is too organizated by the customs obtaining among the cultivators. Unless a tank fills enficiently to admit of the irregation from it of the whole plot of rice land lying below it, the custom in some villages is to provent the cultivation of rice on any part of it so as to avoid dispotes about the right to the water."

And Mr. Rogers as Settlement Officer wrote in 1851:—

And Mr. Rogers as Settlement Officer wrote in 1851 :-

"I explained in a former report to the late Revenoe Surrey Commissioner that the rice-growing lands of the district were situated entirely under tanks or in low situations where water would lie in the monsoon: their value, therefore, entirely depends upon the supply of water thoy can calculate upon receiving upon an average year after year. Even, however, nuder the most favourable circumstances there ocenr in Gojarat such seasons of drought that these lands cannot be cropped with rice."

Forther on in the same letter be writes :-

"Another great size qua non for the development of the resources of the district is the improvement of its means of irrigation. Rice oultivation could be effectively maintained and improved by attention to the despening and clearing out of tanks."

- (c) In a year of drought no tank in Gujarat would be of any ose for Irrigation.
- 26. I have known the tank-supply to be eked oot in seasons of scanty rainfall by well-irrigation.
- 20. Sofir as I know, thore is no regular provision either on the part of the cultivators or on the part of Govern-

ment for the maintenance of tanks useful for irrigation. The people when left to themselves will allow even good tanks to fall into disrepair and roin from want of co-operation and enterprise. Some of the larger Irrigation tanks are occasionally repaired by the Public Werks Uepartment, but I do not think that systematic attention is devoted to them. The smaller tanks are left to themselves.

33. The silting up of lanks is a frequent scores of complaint. The villagers do not combine to carry out clearance work themselves, but they are often willing with official assistance to raise subscriptions in the village for the execution of repairs by official agency.

34. (2) The supply is liable to fall or to become much reduced in years of drought, such as those which Gujarat is now experiencing.

(3) The average cost of construction I would put at Rs. 350 or 400.

- (5) The water is raised in water bags drawn by bullocks.
- (6) The arcrage area uttached to and commanded by a well I woold pat ut four acres if the crop exclusively depends on the well-water.
- 35. In a year of seasty rainfall a well is useful in two ways for rice :-
  - (1) When rains are late at the beginning of the season it enables the well-owner to prepare his rice nursery beds curlier than the man who has no well: and his rice thus can be transplanted earlier and get the benefit of the rains as soon as they fall.
  - (2) Whou rains are scanty at the end of the sensee it enables the well-owner to give his rice crop the last waterings which may make all the difference between a total failure and a normal crop.

38. (1) Yes.

In some cases wello are impossible in an entire village, because they are sure to be salt. In many cases it is impossible to know before digging that the water will not prove to be salt. A salt well may be mot with 20 yards away from a sweet oue.

- (2) I have heard of cases where the attempt to construct a well has had to be abandoned owing to the soil being so sandy that the sides of the well fell in.
- 40. Tempriary wells are commonly used in some parts of the Ahmadabad District, especially for rabi cultivation, in alluvial river side lands or in river bods. They are of great use especially, I think, for rearing fedder crops, and for this purpose were largely resorted to le the recent famlue.

Their construction could be encouraged by liberal grants of takavi, as the cost of construction is trilling.

- 1. Q. You are Collector of this district !- Yes.
- 2. Q. How long have you been in here!—I came here in May 1899.
- 3. Q. From your printed memorandum it appears that you have been in Kairn too?—I was there from November to May. My connection with Gujarat begins with May
- 4 Q. Where were you before that?—Before that I was in the Decean, in Sholapur and in Sindh.
- 5. Q. You were in Gujunt through the whole of the famine?-Yes.
- 6. Q. You say the columble and of this district is 1,723,001 acres; about how much of that is coltinated?—
  I could not say without referring to the statistics
- 7. Q. Are the people in the habit of leaving nach land faller ?-I could not say; I only came here during the famine, and I think a great deal of land lies follow on a count of the famine.
- S. Q. The amount of culturable area covered by Government works is a mere begutelle? -- Yes, a very insignifienut proportion.
- 9. Q. (Mr. Muir-Maclenzie)—That does not include tank lands?—No; but I don't think that would increase the area by more than I or 2 per cent.

- 10. Q. (Mr. Muir-Mackenzie) There are tanks for rice irrigation? Yes; they are not included in my figures.
- 11. Q. (The President)—You say in your noto that there has been a very great increase in the number of wells in the last five years; in 1890-97 there were 55 wells, and in 1900 there were 1,115 wells?—Yes.
- 12. Q. Takavi advances were giren in the same proportion?—Yes.
- 13. Q. In 1899-1900 the takuri advances amounted to Re. 1,41,000?—Yes, for land improvement.
- 14. Q. Not for seeds f-No; for land improvement; seeds and bollocks would not be included.
- 15. Q. What would be included f-Almost entirely wells.
  - 16. Q. There was an enormous increase of wells ?- Yes.
- 17. Q. Are temporary wells incloded?-Yes, they are.
- 18. Q. I suppose there is a large proportion of these temporory well-?—Yes; I could not say how many.
- 19. Q Ther woold not require much takavi advances, because kacheka wells east so little P-Yes, the bulk of money would be for palka wells.
- 20. Q. You say in paragraph 5 of your note that "you see no reason for recommending a reduction of the rate of

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- interest or remission of interest." That is as regards loans for improvement?—They do not require any inducement. I don't think that the knowledge that the interest would be reduced or remitted would be a great inducement. What they require is a prompt disposal of their application and prompt receipt of money; they don't very much core what the rate of interest is.
- 21. Q. Csn you suggest any procedure for the prompt disposal of their requests ?—I do not think the system can be improved.
- 22. Q. How long does it take under ordinary circumstances to get actual payment?—There are considerable dolays; a man may get the money in five months if he is fortunato; I think seven is a fair average.
  - 23. Q. Could that not be improved ?-No.
- 24. Q. The man can go to the sourcar and get his money at once over the counter?—Yes, if he has credit. There was so much delay recently as the amount of work was enormons, I do not think it would take so long in ordinary years.
- 25. Q. Do you give cheques?—No; that is not done here; the man can get the money from any Treasury.
- 26. Q. (Mr. Ibbetson)—Do you think inquiriss about the rayats' solvoney and encumbrances account for the delay in his getting the money? Supposing the inquiries were ahandoned, would it make any difference?—Yes, certainly.
- 27. Q. A substantial difference?—Yes, undoubtedly; but none the less is the enquiry necessary.
- 28. Q. Why? seeing that the loan is the first charge on the land?—Because it might be that the man is not solvent, or that on gotting his loan he is likely to misapply it and the amount might be irrecoverable.
- 29. Q. You always make the loss depend on the seenrity?—Yes, that is the object to which our inquiries are directed. We eramine the land he offers as security and ascertain the solveney of the man.
- 80. Q. But the loan is the first charge on the land?—Yes, by law; still we must make sure that the loan is given on sufficient security and therefore we have to make inquirios.
- 31. Q. Is it necessary to enquire into the solveney of the maa and the encumbrances on his land if the loan is to be n first charge?—I think it is necessary; it is doubtful whether the land is not encumbered and whether the Government advance will not he in danger though it is the first charge.
- 32. Q. (The President)—You say in paragraph 6 "I have known the tank supply to be eked out in sensons of seanty rainfall by well irrigation." Is that systematically done on these smaller tanks which belong to villagers?—I think so, but I have not seen many cases of successful rice oultivation in Gujarat where I have had only famine experience.
- 33. Q. In paragraph 38 you say "In soms cases wells are impossible in an entire village, hecause they are surs to he salt." Does that held good in each of these districts of Ahmadabad?—Yes, in a great many of the villages.
- 34. Q. Are there any villages that have not got wells of some kind with drinking water?—Yes.
- 35. Q. How do they manage?—After the drinking supply has become absolutely unpetable they have to clear out.
- 36. Q. (The President)—Would you advocate the districts having at their disposal bering apparatus for the use of the villagers when they want it?—I do not knew. I have found that the people are not able to work it. On the other hand, a boring apparatus in this district is worked by people of a particular class who have a special knowledge.
- 37. Q. Is that a drill for boring?-Yes; some simple contrivance.
- 38. Q. (Mr. Ibbetson)—Do you refer to deepening the bottom of the well?—Yes, to increase the supply-
- 39. Q. (The President)—Is it the custom before sinking a well to make experiments by boring ?—No.
- 40. Q. With your knowledge of this district and of the terrible times through which it has passed, what do you consider would be the best measure that Govern-

- ment can take to protect it from a like suffering in futuro?—The first measure I should take to relieve the most serious distress caused by entire and complete drought would be, if possible, to construct big canals, such as the Saharmati. That would afford considerable relief.
- 41. Q. From what you know would you expect it to carry sufficient water during times of dranght?—If there is no emplete failure of rainfall, I am not sure it would; but if it is a partial failure, it would save a considerable area of rice. The next question is of making small irrigation tanks which, if kept in proper order, will be extremely valuable in irrigating considerable areas of partial drought.
- 42. Q. As a rule are these tanks in had repair?—I think a great many of them are in disrepair.
- 43. Q. Do you know mny instance of people trying to help themselves in the matter of repairing these tanks?—Yes; I know of an instance (I have read of it in the Revenue Settlement Report) where three villages combined and repaired their tank and they alone in the whole rice tract did not have to get remissions.
- 44. Q. (Mr. Ibbetson)—In what year was that?—About 1882.
- 45. Q. (The President)—From the lessons of the last three years would it not be natural to expect some similar action on the part of the villagers in times of drought?—I don't think they are likely to take the initiative thouselves; it will have to be done by some superior authority. The people would quarrel; Government officers should take the matter in hand.
- 46. Q. What do you consider the most suitable form of relief work ?—In this district, small irrigation tanks.
- 47. Q. The existing tanks are not, I think, repaired in Isrge numbers?—Not very largely. In the big famine of 1899-1900, I think very few, if any, were repaired; I should prefer to spend all the money on these tanks rather than on other useless works. If tanks are repaired beforehand they would be very useful in times of drought.
- 48. Q. (Mr. Muir-Mackensie)—Would there be no difficulty in the supervision of such works?—Not if the plans are exefully prepared beforehand in every detail. We did it to a certain extent in the Kaira district last year. I think the thing could be managed if we had every thing to a certain extent eat and dry beforehand.
- 49. Q. (The President)—Have you got a relief programme for your district?—Yes; quite sufficient for our requirements, we do our best in pushing all our schemes, but there are a great many objectious; each one of them requires a great amount of attention, and I have heard complaints about the Puhlie Works Department subordinates not having sufficient organization.
- 50. Q. What would you do chiefly? Dig up silt and repair bunds.
- 51. Q. (Mr. Higham)—Have you considered the Sabarmati schems?—I have read it through; it is an excellent scheme so far as I understand it.
  - 52. Q. Is it on the right bank of the river ?-Yes.
- 53. Q. Is there any scheme ou the left bank?—On the lsft bank ws have the Khari schems that waters rice lands.
- 64. Q. Suppose the eanal is taken higher up the river, would it affect another part of the district?—I think not; nerth of Sanand is the Gackwar's territory.
- 55. Q. (Mr. Ibbetson)—You say that the best use to which relief labour could be put is the clearing of the existing tanks P—Yes.
  - 56. Q. Would you extend them?—Yes, if possible.
- 57. Q. Do you know how far it is possible !—Certainly, it is possible to some extent, because in the Kheri river some excellent new sites have best discovered.
- 58. Q. Do you think they might he expected to bring Government a reasonable return?—I could not express an opinion without seeing the figures.
- 59. Q. You say in paragraph 3, "it is obvious that rice enlitivation with an average rainfall of ahout 30 inches must he at all times more or less precarious and speculative. Do you refer to a whole cycle of hed years, or are you speaking of normal years?—In normal years also it has always been so.
- 60. Q. The tanks may be expected to reduce the risk?—Three years out of five certainly; last year there was

a rice crop under tanks; there was no other rice reaped in the district.

- 61. Q. You say, "the area irrigated from wells is more than doubled in a year of drought." Is that mainly owing to kacheka wells made on account of the drought, or is it due to wells that were ordinarily disused being brought into use?—Both causes contributed, I think.
- 62. Q. Do you know the number of wells that are not crainately used?—I think a considerable proportion are not
- 63. Q. You say that su "insufficient supply of manuro one of the main obstacles to the extension of Irrigation." is one of the main obstacles to the extension of Irrigation."
  Be you know from your own experience, or from what
  recople told you that irrigation does harm if the land is not
  sufficiently manused?—It is a very common statement.
- 61. Q. Yoo have no personal knowledge on the subject !- No.
- 65. Q. (Mr. Rejurated Aldle.)—Do you know of a petition to the Government of Bombay from the people of Dholka, suggesting that an irrheation canal should be constructed?—I heard talk about it the other day.
- 66. Q. Is the project under investigation f-Yes. 67. Q. In paragraph 4 you say "the urea irrigated is 22,000 acres;" is that more than double the area ordinarily irrigated?—A great deal of that was for fodder crops.
- 03. Q. Do you mean that more than double the area was irrigated !- Yes, quite so.
- 69. Q. How do you account for that?—By an increase io the urea and an enormous extension of fodder crops, which require less water.
- . 70. Q. (Mr. Ibbelson)—A good many non wells wore made?—Yes.
- 71. Q. (Mr. Rajaratna Mdlr.)—You refer to the insufficient supply of maoure as being the main obstacle to the extension of irrigation. Are green leaves used for manuro in this Presidency?—I have never heard of it.
- 72. Q. In paragraph 4 you say "land which during u term of survey settlement may have been converted from dry crop land to garden land would on introduction of a revision survey continuo to pay the dry crop rate?"—Yes.
- 73. Q. One witness told us yesterday, that it is likely to be charged on account of sob-soil advantage?—It is always liable to that whether it is dry orep or garden crop under the existing law; any land which has sub-soil facilities, whether they are utilized or not, is liable.
- 74. Q. Does the fact of sub-soil under wells affect the question of increased assessment f—It does not.
- 75. Q. Not even at the next Revision of Settlement?-No.
- 76. Q. Suppose a man digs a well now, will be not be liable at the next revision to pay an increased assessment on account of the sub-sell advantage?—No
- 77. Q. You say "the success in the administration of the act depends upon men, not measures." Would it not ndvisable to employ special officers to distribute leans? Would it not be Yes, on extraordinary occasioos; not in ordinary times.
- 78. Q. If on extraordinary occasions a Doputy Collector could be appointed to distribute loans on the spot, would that tend to expedite matters f-Yes, that would, certainly.
- 79. Q. (Mr. Muir-Mackenzie)—A special officer is actually employed?—Yes.
- SO. Q. (Mr. Rajaratna Mdlr.)—Who collects the canal revenue f The village officers.
- S1. Q. If the village officers do the work is any debit made on account of collection charges !- 1 could not say; I de not know.
- 52. Q. I suppose a village cess is charged in this Presidency i (Mr. Muir Mackenzie replied that, except in Sind, no cess was levied in the Bombay Presidency on account of village establishment which was paid out of the Provincial revenue.)
- bd. Q. How many irrigation taoks are there in the Ahmadahad District i-I do not know, there must be many hundreds; probably 400 or 500.
- 84. Q (Mr. Muir-Maclenrie)—Not something like 1,030?—There may be.
- 85. Q. (Mr. Rajarzina Mdlr.)—Does not your Administration Report tell you that i—No.

- 86. Q. I do not understand the difference between rice tanks and field tanks? Mr. Muir-Maclenzie-They were separately treated before the survey was made; we have no separate headings now.
- 57. Q. Mr. Beale recommends the construction of field tanks, and for that purpose he also recommends a survey. Are there any field tanks?—Yes, there are.
- 88. Q. (Mr. Muir-Mackenzis)—Have you had any practical experience of these landhsf-Yes.
- 80. Q. Would they be a suitable work for famine reliof?
  —Yes; very suitable because of their simple construction;
  very little technical knowledge is required, any man who
  has some experience can manage such works.
- 90. Q. You say that tanks could not be constructed without a considerable account of technical knowledge and experience? —I think so; I should be very sorry to trost it to Local Fund Overseers; they have very little experience of irrigation; practically none.
- Ol. Q. You would prefer that the work be done by Government?—F would prefer that the scheme be prepared by the Public Works Department; the Local Boards would then be competent to carry it out.
- 92. Q. Would you make the rerenue arailable to the Local Boards?—That could be done; I have not considered the subject, but I see no objection to it.
  - 93. Q. The Board's revenues are very inelastic !- Very.
- Dt. Q. They depend entirely on the Land Reveous which cannot change for thirty years?—Yes.
- 95. Q. An additional conrec of iocomo would be u great
- 96, Q. Have yoo any experience of the water-logged areas?-No.
- 97. Q. Here you heard complaints regarding these drains ?—I have heard complaints that the drains were not sufficient to carry off the water.
- 93. Q. Were you able to form any judgment of the area for which the drains were sufficient?—The drains had not done their work; they were ntterly incomplete, and only half finished.
- 99. Q. If completed, would they have been visioble ?-
- 100. Q. Io years of ordinary rainfull?-They are liable to be flooded.
- 101. Q. Do yoo believe that in years of ordinory rainfall such drains might be extended f.—I do not know how; I have very little experience of water-logged areas; I have seen very few.
- 102. Q. (The President)—Have you reason to believe that if they are dismaed, the mischief will go on increasing P—No, I read that in old times very serious damage was done by flood.
- 103. Q. (Mr. Muir-Mackenzis)—You have not heard complaints that the draios damaged the adjoining lands by carrying away surface soil?—No. -You have not heard
- 104. Q. Do you think that for the construction of wells the people would prefer that Government should pay the cost of the well and charge additional assessment instead of charging interest and taking back the principal?—The permanent assessment would be most unpopular; anything in the nature of a permanent enhancement would be so. He would sooner berow the money and make the well himself.
- 105. Q. Do you advocate a considerable extension of the period of instalment ?-I think 20 years are sufficient.
- 106. Q. (Mr. Ibbetson)-What is the period in ordinary practice F-Teu years.
- 107. Q. (Mr. Muir-Maclenzie) Do you think a longer period for repayment would be better?—Certainly.
- 108. Q. The rayat would like to pay it in 50 yearsf-That is perhaps going a little too far.
- 109. Q. Do you think the people would like that ?-I think they would.
- 110. Q. Would that not be practically a permanent assertment?—Yes.
- 111. Q. Your idea is that the people would prefer to have the period of repayment extended from 10 to 20 years to having 50 years or an indefinite period. Suppose no remitted the money and charged not accomment t—I think a permanent assemment would be a great drawback.
- 112. Q. (The President)-Would it lower the value of the land?-Yes; I think that the man would prefer to raise the money himself, I am sure he would prefer the

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repayments in good years, he would probably pay larger instalments and get rid of the debt sconer; mything meaning enhanced assessment would ereate mistrust.

113. Q. (Mr. Muir-Markenzie)—You would prefer not to see the experiment tried?—I think not.

114. Q. We have been told that the extension of wells is limited by the manurial supply ?- Yes.

115. Q. Possibly you can get over that difficulty by giving a man an advance for wells and also for additional cattle at the same time?—They would not increase the stock of cattle for the sake of manaring their land.

116. Q. A man might bny cattle or he might bny mannro with the ndvance given for manare ?-They do not do that to my knowledge.

117. Q. Is there no chance of getting night soil used. It is used in Ahmadabud?—I think that could be done.

118. Q. (Mr. Ibbetson)-You say that mything in the way of a pormanent assessment would create mistrust? - Yes. 119. Q. We have been told by several witnesses that people do not feel quite sure that if they make wells there will be no enhancement of assessment?—I do not think there is any such feeling. .

120. Q. If the assessment is raised, you could tell the occurants that it is not on account of private improvements?—Only very few would understand the grounds on which the assessment was raised.

121. Q. You do not think there is may feeling that the private improvements are assessed f-I do not think so and hare never heard that such a ferling exists.

122. Q. (Mr. Muir-Mackenzie)—If a tank is muce people do not object to increased assessment on their lands because they obtain water; why should they object in this case?—I think the cases are different. Tanks and irrigation canals are not quite analogous to wells.

123. Q. They are both made by Government?—I think the wells are much more in the nature of private property.

Mr. B.Kisparam. WITNESS No. 16 .- Mr. BRINDHAI KIBFARAN, Talakdari Settlement Officer, Gujarat.

Memo. by Witness.

I.—Character of the Soil.

Gnjarat soils are of three chiof kinds :-

(a) Kali or cotton soil, a black loamy elay characteristic of the Tapti and Nerbudda watered Broach and Surat districts ; sweet alluvial plains.

(b) Gorat .- A light fawny-coloured sandy loam characteristic of the Mahi and Saharmati valloys in the Knira, South Ahmadabad, and Paneh Mahals Districts; presents the highest type of cultivation in Gujarat (in the tract called Charotar about Nadiad).

(c) Goramti.—A reddish loamy clay, peculiar to parts below the Western Ghats and to the Gogha and Modasa hille.

Peculiarities of locality and climate divide kali and goral, each into six variotics, which account for the varying fertility of different parts of Gujarat.

Kali or black soil has six varioties :-

(a) Kali or regar -- Pare black, argillaceous loam; free from stones or pebbles; abounding in carbonates of lime and unugnesia-a long onduring and fertilo soil-Broach plain.

(b) Kali Khokhar-Greyish black, argillaceous, resting on kankar, intermixed with nodules; oasily affected by changes of weather, becoming either very wet and stiff or very hard and fissared; sultable for wheat, juari, and · riec.

(c) Kali-bara .- Snuff-coloured and friable; containing chloride of sodium, or carbona'o of soda when deep; not unsuitable for cotton, but more adapted for wheat.

(d) Kali Besar.—Dark brown; near trappean rocks with small disintegrated pobbles; with more of peroxide of iron than kali regar, but less of magnesia and lime; much coarser in texture; valuable black cotton soil for gurden cultivation; better for superior rice than kali

(c) Kali-Matodi. - Sodimentary; colour from grey to black; collects in rice beds and low-lying tanks; highly valued as top-dressing for light red garden soils.

Kayarda or kyari.-Not exactly soil, but the propared hed in which rice is raised with or without irrigation; colonr black or red; valuable, according as rotaining water to ond of rice season.

These varieties of black soil are wet and heavy in rains; These varieties of black soil are wet and heavy in rains; but dry, hard, and fissured soon after; discretion and experience needed in working them advantageously. Superficially retentive; they contain springs in great depth, often with brackish water, unfit for irrigation; bad for bedges and trees, and not fit for perennial cultivation. But irrigation and careful husbandry have made even three colleges are the of high cultivation that contains a superfict of the colleges. thrse soils capable of high cultivation.

Gorat soil varieties have characteristics opposed to kali soils.

The six varieties are-

(a) Goradu proper, composed of disintegrated particles of sandstone, limestone, and secondary rooks; called retal, rana, mor-rana when incoherer; and mardi, when much mixed with nodnlnr lankar; colour varying from light fawn to rich brown; and texture ranging from mero drift-rand to loam; contains lime and so not barren, hat very fertile; if not separated from an earthy sub-soil called goramts, capable of great improvement under irrigation and proper tillage; shows superior cultivation in manured fields near towns and villages; best adapted for dry-coop eerea's, with irrigation produces varieties of regetables.

(b) Goradu-besar is goradu proper, but leamy, full of fructifying properties of blook and light soils combined; its silicious and calcareous components are reduced to fine mould by moisture and weathering, and decayed matter from trees, hodges, and artificially. Trees, bushes, nnd potash loving plants grow in it readily and vigorously; possosses alkali and therefore, specially valuable for tobocco, and the triennial variety of cotton.

(c) Gorat-marva, found ohiefly near banks, or in deserted beds of rivers; shows a micaceous scintillation; free from pebbles; varying in colour from light brown to chocolate; very absorbent jet retentive; not hard even when dry, nor muddy when wet; rich in organio matter; generally found of uniform toxture and quality to a great depth; has sweet water, found a few feet below anriaco, and it is therefore called untural bagayat or garden land, whether irrigated or not. Withent any following, all the most valuable orops are raised upon it in rapid uncession.

(d) Rakhdi-ralu, also called puran and gabhan, is the soil of old village sites, rich in nitrate of potash, though poor in appearance; it yields tich crops of grain, especially tol acco, the latter mostly without irrigation.

(c) Gorat, heing the red and yellow clays of Pardi in Surat and Gogha in Ahmadahad; of laterite and limestone formation like the Konkan soil; in lower levels, it passes into the kali khokhar variety, and is best snited for rice cultivation.

(f) Bhatha or alluvial, is a fine micaceous chocolatecoloried learn munally deposited in the loops of rivers
and selects, charged with the fertile ingredients of distant mind using the second with the territor ingressions of distant mplands and villages; its best quality is free from sand, and possesses richer and lighter particles in solution; thus it is naturally fertilized, oaslly cultivated, and in its desp proist hed it readily matures without irrigation most valuable garden produce.

All these red varieties are hest for general cultivation; contain springs at no great depth; give better return on capital than black soils, show perennial verdare, with plenty of trees, hedges, and universal caltivation.

Besides kali, gorat, and besar, there are, of peculiar soils, along the Surat coast, the marshy lands called khar and khajan; and in the Pardi sub-division the soil is more like that of the Konkan than of Gujarat. Kaira has near Matar, salt or khar lund; in Kapadvanj and Thesra, waste and ill-drained mal or upland, also found in Godhra; and waste had had or upland, also found in Godhra; and near the Muhi, a coarse, shallow and dry soil called mardi.

Throughoat Gajarat, the light alluvial said rich gorat soil is superior to the kali or black soil.

As compared with other districts, Surat is conspicuous for the large proportion which its fertile soils hear to intrinsically poor soils.

Of the entire enlturable area of Surat, 18th is black, 12th is light and 18th is medium, or besar soil.

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In Broach 18th is l'ack, with crops of rice, cotton, wheat miliet and juari. Of the remaining 7sth of goral or light soil, 7sth yields cerea's, pulses, and garden stuffs; and 15th is the rich allarial blatha in which all crops, especially tobacco and castor-oil plants, are raised.

In Knirs, the light or gorst prevails, varying from loos! fawred yellow sund in fields near the Saharmati and Mahito rich light brown mould in Central Kaira, and attaining to rich light brown mond in Central Kaira, and attaining perfection in Matine. Besar soil, varying from henry sanda to light class is pretty generally distributed in small tracts over the whole district. The black soil is poor, scarcely ever deep, and most of it mixed either with soda or lime stone. Allowin bhatha, chiefly found near the Vatenk, yields every year without dressing or fatlow rich crops of tobarce, safflower, and other garden produce.

iobace, softlower, and other garden produce.

In the Panch Mahale bhatha, mal goradu besar, and kali are all found in different parts. The besar is well suited to rice, kedra and coaree grains. Kalol has much of goradu. In South Hulol are stretches of rich black soil. Except stony hill ridges and patches of shallow gritty and red and dry black, the suil of the eastern talukas of Dohnt and Jhul-d, both light and black, is perhaps, from the abandance of underground stream water, of very high quality. The light varying from fawn to reddish hrown, yields two, and, if watered, three, crops a year.

In Almadahad black sail is found chiefly towards the

yields two, and, if watered, three, crops a year.

In Ahmadabad black soil is found chiefly towards the west and light in the east. But in many parts both occur within the limits of the same village. Thu black soil is much impregnated with alkali or Lhar. The light soils are well supplied with springs which candle the rayat, at very little cost, to have rabi or winter, and hari or summer, crops after the Lharif harvest. Dhandhuka and Dholka have low bara lands, too moist for cotton, but saitable for rich wheat after rains subside. The bhatha soil ahand the Submrasti is most fertile. To the north-east of Parantij is a red stony soil favourable for Indian-corn. In the high parts of Goghn and Rapper it nocumulates in a rich loam that yields good crus of sagarcane.

#### II.-Irrination.

Irrication in Gujarat is from taoks rivers and wells. According to the method of lift and delirery, it is colled (1) Patasthal, (2) Methathal or (3) Dickadiat.

- According to the method of litt and delivery, it is called (1) Patasthal, (2) Methathal or (3) Dhekndist.

  (1) Patasthal is by gravitation, as from canals and dama built to confine the water in a pool, until it goes sufficiently high to flood the traot mean to be irrigated as in khari villages, or fields below the tank lovel, from which it is received through a sinice gate, or more often, sinply by cutting the embankments. If the water has to be russed only four or five feet, jails are used. There are of three vinds: supda, chorsan, and lever. The first is a rough and rady process for utilizing temporary pools of minewater. It consists of a shovel-shaped basket or supda utiched to two ropes worked by two men swinging the water by a jerk to n few feet higher channel. The second consists of a wooden trough, two or three feet wide, and eight to ten feet long or leather distended over a bumboo frame-work of the samo size called chorsan or jails worked by n heavily weighted lever on a cross frame of poles. The smoot of the trough resting on the higher channel, the body, to which a rope from the lever is attached, is pressed into the lower reservoir, and is a nisted up for discharge by one or two men. In the third, a similar lever, working on a single pole like a yard mot mast of a ship to which a hacket is attached, is used to raise water from shallow wells.

  (2) Mothathal for raising water from wells and rivers by
- (2) Mothsthal for raising water from wells and rivers by leather bage called ramio or sundhio kos. Somotimes, the Persian wheel, called rekent, and the capetal barrel orn used. The ramie kos is a whole hallock-hide, with cut corners, pursed with leather thongs to astont iran ring affects to eighteen inches in diameter. It holds from fant to six cubic feet of water. It is attached with a swired chain to a stont cow-hide rope, and drawn urer a wheel to a stout raw cow-hide rope and drawn over a wheel moving between two sloping prope resting an a beam sapported over the well by upright posts. It is drawn by a single prin in hallocks descending a slope, with the backet rope attached to the tarila yoke. On the leather bag reaching the terel of the discharging trough, it is bumped down and callapsed. A man on the trongh gives a song signal when the hallocka are to start, and when the rope is to be detashed from the yoke, which latter the driver does by pulling out a taggle or pin. (2) Mothsthal for raising water from wells and rivers by

The sundhie differs from the ramie is having its suont sum on to the bog, and an additional rope attached to the smoot working ou a roller at the base of the platform. Both

sanni rope and lift, attached to the platform are so arranged that, on the bag reaching the level of the trough, it emption of itself. In the rando the hullocks have to be detached from the bottom of the incline, turn round, and walk up to be re-attached. In the xundhio the bullocks me not detached and have to slowly lack up the incline.

(3) Dhekudi is the common apparatus of a wheel, erected on the high perpendicular vergenin river bank and a single pair of halleess draw up the los elther rumio or sundhio according to the depth of the water. The dhekudi can only be used where the stream is immediately henesth a perpendicular bank, or led there by connecting channels cut through the bed of the river.

#### Garden Cultivation.

The cultivated londs in Gujarat may be classed under three heads:—Jurayat or dry-grop land, Dangar or rice-land, and Bagayat or gurden lands.

The proportion of irrigated to the unirrigated land is zoth; and of garden to dry-crop land in zoth. Dangar or rice-land comprises zoth of the total cultivated aren; and irrigated to unirrigated rice-land is zoth.

irrigated to unirrigated rico-land is \$1d.

For n province so fertlin and with such resources as Gujarat, the above extent of irrigated land is vory short. Under a proper system of irrigation its produce would be unlimited in variety and asperior in quality and quantity. The value of irrigation is practically the difference between the production of the cereal staple and yield of the malyat or garden crops which give two to ten-fold more to the raysts capital thereon invested. The cultivation of these malyat crops, such as supercase, plantate, ginger, turmerie, and chillies depend very much on capital and the raysat's resources. Even with clear prospects of great profit, only the man with large capital is able to intempt it. Such cultivation is seldom possible for a single rayst, because ploughs, cattle, and labour are required to prepare the land and raise the water from wells. In such cases, three or four myats have to combine and norsk such a profitable underthing.

The scope of garden caltivation is large and deserved en-

The scope of garden calcivation is large and deserves encouragement

For purposes of irrigation it is not necessary that a tank should retain water during the whole year. It is enough if thin pool covers a large surface, and is so situated that the land to be irrigated lies around and slightly below it. In the event of a scanty rainfall, the cultivator has recovered to his tank in September and October, and by watering them saves his early or khorif crops. For the ordinary late or ravi crops, it is enungh if the supply of water lasts through November and December. So that, except in the case of supercase, if the reservoir contains a supply of water to the end of Docember, the cultivator is independent so far as his crops are concerned. Pouds of the above description are easily made and at a small cost. easily made and at a small cost.

## Question 5.

Loans under the Land Improvement Act are not freely taken by the people for the extension of irrigation. It is desirable that instalments he extended to forty or fifty years and not less than thirty years.

No interest lo be charged if the talari recipient agree to repay the loan by ten yearly instalments.

The rate of interest to be 2 per cent. If the taknri recipient agrees to repay by twenty yearly instalments.

The rate of interest aut to exceed 4 per cenl. if the takaci recipient agrees to repay the loan by thirty yearly instalmente.

If the water of the well becomes brackish or unfit for irrigation, or, if the well is damaged, or becomes otherwise unfit for irrigation purposes, the instalments due thereafter should be remitted.

I am unt in favour of the construction by Government of wells in land which is private property for obvious reasors.

## River Irrigation.

As most of its rivers flow along deep narrow channels with sandy beds, the province of Gujarat is not well suited for direct irrigation. This is especially so, as serious less of water-supply is caused in bringing canal water several miles from the rivers to command fields on a much lower

Mr. B. Kirparam. 4 1 cc. 01.

Mr. B. Kirparam. 4 Dec. 01. levol. At the same time, there are many spets along the course of several Gujant rivers, where, by means of a frame on perpendicular river banks, water is raised by bag B.

The chief difficulties in river irrigation seem to be (a) high banks in sems parts, (b) absence in the river-bed of a solid foundation for weirs, (c) want of suitable sites for storage reservoirs, (d) looseness of soil whereby the loss in soakage is so great, that, oven within a limited arco, water will only go about half as far as in heavy lands.

The Narbada is the largest river in Gajarat which posses through a pertion of the Breach district, most of it, and consequently tidal, unfit for irrigation.

The Surat district has cloven rivers, the Tapti, the Mindhola, the Purna, the Ambika, the Auranga, the Par, the Kolak, the Damanganga, the Kavori, the Kbarera, the Vauki and the Kim rivers.

The Tapti is the second Gujarat river with a coorse of 70 miles across the alluvial plain of Surat, of which about 12 miles are subject to tidal influence.

Though no lands are at present irrigated from the Tapti, projects with that object have been framed by Captain Chembers in 1859 with an estimate of Rs. 36,75,000, and by Colonel Trevor in 1867 with an estimate of Rs. 1,32,00,000, and a further scheme in 1871 on a smaller scale with an estimate of Rs. 41,00,000. Attention is requested to a summary of the projects given in Hombay Gazetteer, II, pages 15—18 (wide also Bombay Gevernment Solection, New Series, LXI.)

If protection from famine and not a remnuerative return on the outlay be intended, the Tapti is suited for irrigating parts of Maudyl and Olpad in the Surat district and Ankleshvar in the Breach district.

The remaining smaller streams rise in the high-land to the east of the Surat district, and flow west ward in many cases over rocky beds between banks wide apart formed sometimes of ulluvial cliffs, and at other places sloping goutly to the stream. 'Swellen into torrents in the rainy season, the freshes soon pass off, and in the dry weather only a seasty flow of water remains trickling among stones oud in places forming deep pools. About 10 miles from the coast, they are subject to the influence of the tide.

The Surat District has a large garden cultivated area which admits of extension, if proper facilities are given by irrigation. And it is necessary to investigate how far, by storage reservoirs or otherwise, the waters of these rivers might be used for irrigation purposes.

In the case of the Mahi river especially, its high rugged banks prevent its water being used for irrigation; and, so deep is its bed that, it drains rather than feeds the springs near its banks. In the Panch Mohnls on account of the broken ground along its banks, the water of the Mahi is seldom used for irrigation. .

The Sabarmati, the fourth river in Gnjarat, is largely used for irrigation during the fourteen miles of its course along the western limit of the Kaira district.

In the Ahmadebad district the failurs of the late raius injuriously affects its rice cultivation. If it can be arranged to give the surplus water of the Sabarmati, if any, to rice fields, valuable rice crop might be saved. This would also materially help the broken peasantry and improve their condition.

The Hathmati and the Khari rivers have already been used for irrigation by the Irrigation Branch of the Public Works Department (vide Bombay Gazetteer, Volume IV, pages 6-7.)

The Shedbi river in Kaira, after meeting the Mohar, has its water so charged with soda that being found hurtful to crops, its water counct be used for irrigation (Bombay Gazetteer, III .)

The Vatrak, flowing in Kaira between alluvial banks about 20 fest high, and with a shallow and failing stream, flows over a bed of sand about hundred and fifty feet broad. Its water is at present much used for irrigation by the help of lifts (Bombay Gazetteer, III.

The Khari passing through Kaira and falling into the Sabarmati waters many rice-fields by banks thrown neross. Formerly of earth, these embaukments here new been replaced by seventeen permanent masonry dams with sluice gates commanding an area of 11,000 acres in cloven villages (Boshbay Gazetteer, Volume III, page .)

#### Wells.

- 1. In Surat and Broach districts, permanent wells have an average depth of 30 feet. In Kaira, the depth varies from 25 feet to 46 feet, reaching to from 70 to 140 feet in the south cloug the Mahi. In Ahmadabad, the depth varies from 30 to 60 feet. In the Panch Mahals, as springs are found clese to the surface, wells are not sunk more than from 15 to 30 feet. Debad and Jhaled are better supplied with streams which hold water throughout the year, and are readily available for water-lift irrigation, as in many places their banks overhaug.
- 2. (a) In an ordinary year, the supply in the Panch Mahals is from springs, percential and sweet. In other districts the sopply is by percelation and percential. In parts of Ahmedahad, it has a tendency to become solt.
- (b) In a year of drought, the water level sinks low, especially in Kaira and Aumadabad. Coses of total failure are not known.
- (c) The average cost of constructing a one kos mosonry well about forty feet deep varies from Rs. 400 to Rs. 600. There are many old mosonry wells in the province of eight or 12 kos, especially in Kaira and Ahmadabad, which would now cost from Rs. 3,000 to Rs. 5,000 to build. An excavation of snitable diameter for one or more water bags being mode to a certain depth in the firm soil, until water appears, a circular frame, generally made of samda wood which has the virtue of bordening in water, is slipped to the bottom, upon which a brick-work called tundi is built up, while the digging work still continues. The superstructure sinks as far as it is possible to dig, in aid of which several lifts are kept that at work, drawing off the flowing water. In this way the tundi is ofton sunk 16 or 20 feet below the first oppearance of moisture. The brick-work intended to be under water, is carefully filled with mortar, coment being only used to finish the upper parts. If the spring should fail after a time, a second tundi of smaller diameter is let down on the same principle, and occasionelly a third, the cost averaging Rs. 100 for overy additional ten feet of digging.

Unbuilt or kackeka wells abound in all ports of Gnjarat. These are simply holes of from 10 to 25 feet deep, and about three in diameter, dug in the allowiol soil, without brick-work or masonry, costing each about Rs. 10 and lasting only for one year. When one falls in, a fresh hole is dug in some other part of the field. Built wells vary considerably in cost. An average masonry well from 30 to 40 feet deep costs about Rs. 400 to Rs. 600.

- (d) The average duration of a properly built well, if kept in repair from time to time is not less than a landred years.
- (c) All through the province the water is raised from wells by the ramio or sundhio leother bogs.
- (f) The average area attached to and commanded by a well is three to five acres.

## Well Irrigation.

The bhal or block soil country in West Ahmadabad, including half the Dhelko and the greet part of the Dhandhuka talukas, has, in ordinary years, a prolific crop of wheat and cotton. But the tract is liable to distress in a year of drought, end counct be protected by well irrigotion, as sweet water is searce, and the soil has a tendency to get solive.

The same remarks apply to the bara or coast tract of the Vagra, Jambusar, and Amod sub-divisions of the Breach district.

In Kairs, except in the north, near the high banks of the Mahl, weter is generally found at a moderate depth, and the sub-soil water is so good that wells are not inflected by ordinary short rainfall. Consequently all through this district, and most in the tract about Nadiod called *Charo*tor, well irrigotion is very general.

In Surat and Broach wells are generally perennial and are not known to fail even in years of drought. But well-irrigation in Broach is not so general as in Surat and Kaire.

All through the province of Gujorat well water is largely used for the proposes of sugarcane, tobacco, vegotables, condiments, spices, and other garden produce colled lagagat.

## Rice, Irrigated and Unirrigated.

Rice cultivation comprises Toth of the total cultivated area of the province, as being a crep adapted to the soil and climate, and also remanerative. The most productive rice-fields are in the Chikhli taluka of Surat, with 22 per

cent. of the total village area, and also in the Mater faluka of the Kaim and the Daskroi and Sanand talukas of the Abmedabed district.

The two chief varieties of rice arr (a) Akasia dangar, which is raised in wet land subject only to the direct rainfall, and (b) Pit dangar, raised by auxiliary irrigation from tanks, rivers, and takes.

As rice requires moisture, low-lying land near tanks or the lower termoes of elevated land into which there is ample draitage, are cought for ric entitutiou. Kali besar, which is an admixture of red and hladi, n calcareous clay, is the most productive soil. Next is the reddish clay of Pardi in Surat and Modara in Ahmadabad; but as a rule the gorat or red soils are not retentive enough. Much also depends upon the emlaukment. A properly embanked diasia pit at the base of a cultivated ridge is almost as productive as fields under tanks, except that the Pit dongar owes its superiority to the security against deficient rains and the ability of the rayat to raise the finer variety of kamed rire, which do not ripen before the 15th November, a full month after the commoner kinds raised in Alusia pit have been harvested. Abundance of water is found to be more essential to the crop than the quality of the soil, which latter admits of improvement by manuring. the soil, which latter admits of improvement by minuriog.

the coil, which latter admits of improvement by annuring.

Rice land is first prepared from waste or previous jarayet celtivation, by making a surrounding embankment to impound rain water, and level the bed at a cost of from Rs. 10 to Rs. 20 per acre according to height of embankment. This is followed by plongbing and cross-ploughing on the first fall of rain in June with manuring if it is intended to secure a good after-crop. Sowing is by (1) broad cast, by (2) drill, or by (3) transplantation. Ahuadance of water is necessary until the ear appears, after which mere externion suffices. Akasia rice crops frequently fail for want of a few timely showers in September; hence the great value in such cases of anxiliary water resources in the province, though the same may not absolutely be needed in most years for the common qualities of rice. All the fine qualities of rice which require moisture till September and which do not ripen until a fortulght or a month after the others can only be raised by irrigation.

Rice belongs to the kharif harvest in Gajarat except in

Rice belongs to the kharif harvest in Gajarat except in the hed of the Tapti in Mandri in Sarat, where a summer rice crop is raised. In the Breach District, rice is grown with cotton and other cereals without ony irrigation.

To secure his rice crop it io not unusual for a cultivator, who has no well, to hollow near the field, a small pond in which a supply of rain-water gathers, and if the latter mins fail, is carried into the rice beds by a channel or more often by a water lift, jhilu.

Sngreane is one of the most important garden crops. After the plenghing in June, the sowing begins in November with a harvest in December of from 45,000 to 83,000 cames per acre' from a sowing of 3,000 whole cames per acre or 2,000 pisces, cace containing from 5 to 7 cars. The field has to receive a flooding after November, and as soon as the shoots appear well above ground, compartments

are formed, and irrigation is applied in turn in every tea or fourteen days, so that the whole field receives about 24 waterings in the year. Land is incapable for the growth of sugarcane every year, and profits of cultivation depend on the results of four and sometimes of five years' rotation of less productive crops. While the cost of enlitration of an ocre of angarcane is almost constant, profits are very uncertain, and no steple varies so much in market value and the rayat cannot afferd to keep it in hand. The cost of producing eight thousand canes is about Rs. 187. The best cultivators of sugarcane are in the Amaika valley in the Surat District, where the land is alluvial, and not embanked for rice. In the case of embanked kali soil under a well, sugarcane comes in every fourth or fifth year and sice cultivation only ceases in the harvest year of the sugarcane called rasida.

Ghau or wheat is both irricated and unirrigated. It is grown throughout the province in all black and desar soils, but its cultivation most specially belongs to the barz or coast tracts and the bhal or plain country of Dholka and Dhandhaka. It requires good land, not the rich learny soil of cotton and jurar as it is too loose in texture for the wheat cruy, which entirely depends on the retention of moistone in the soil. If Irrigated it has to be always manured. The irrigated or Iddium wheat are of computatively less market value, which shows that irrigation is not congonial to wheat.

Harley or ign is receptlic an after-oran in garden vice.

Barley or jav is generally an after-oran in garden rice lands or in soils too sandy and open for wheat. It is always irrigated and measured. The tillage and irrigation being the same as in the case of Sanka wheat. It is a favourite crop in the gerat tracts of Ahmadabad and of Kaim.

Tobarco, when irrigated, is called pit or watered. A watered pit yields twice as large a crop as a dry crop. At the same time, the lraf of the irrigated plant is coarser and not more than one-half as valuable. Light or geradu land is the soil brst suited for the growth of the irrigated crop. The Kalva tobacco wante from five to twelve waterings, according as the well is perfectly sweet or more or less brackish. less brackish.

less brackish.

Of the condiments and spices ginger, grown in geradu or garden land, requires itrigation. Soil of the garden besar type is proferable to the kali besar, rain on undrainrd fields being not unfavourable as teading to ret the roots. The field receives about twelve waterings before it is ready to be dug up in November.

In the case of chillies or marcha, a small quantity of water is required for the first month. After this, the plants are irrigated after twelve days on failure of rain, and the chillies gathered as they ripen, which they cootione to do till March. The chillies raised in wet land without irrigation in the Limbdi villages of the Panch Mahals attent far greater perfection than the same variety watered elsewhere. The condimont aime is sown by hands in bels In October, which are irrigated once a fortuight. Methi, grown in gurden lands, is irrigated fortnightly.

- 1. Q. (The President.)—You are Talukdari Settle-ment Officer of Gujarat !—Yes.
- 2 Q. How long have you held that office?-For five Feate.
- 3. Q. The whole of Gujarat is under you?-Yes, except Sarat.
- 4. Q. You have been good enough to write a very full remorands in containing a great deal of information about soil and about irrigation. Were you also here during funiae?—Yes.
- 3. Q. I suppose you were working in the proviore?-
- 6. Q. Was there a great deal of distress?-Yes.
- 6. Q. Was there a great deal of distress f—Yes.

  7. Q. With your experience and knowledge what do you if ink is the right thing for Government to do in order to protect Gujarat from the ravages of such asfaminous the last i—The enditions of the different talukas and districts tary so much that one system will not suit all; for some talukas utils are the lest, for others storage. It is very necessary to consider the peculiarities of each taluka and district. As we can see by a reference to the map of the Ahmalaba'l district, there is in Dhandhuka Taluka a tract called the B'all where rice irrigation is not possible but where the natural nivantages are so great that I to I induces of rain are sufficient to raise a humper crop of wheat.

This area supplies most of the Gnjarat Districts and Kathia-war with wheat. This part cannot be protected even at the expenditure of any amount of money, because it is not fit for rice irrigation.

- 8. Q. Two inches of rain are sufficient?-Yes; for wheat.
- 9. Q. It will not grow rice?—No. This part suffered the most during the famine. The people were removed with their cattle to those parts where there were facilities for obtaining water,
  - 10. Q. Were they willing to go ?-Yes.
- 11. Q. Did they make irrigation works and use them?—, Yes; they came with their cattle and children, constructed works and irrigated their crops, using the water of the Salarmati river.
- 12. Q. This water is not taken in ordinary years?—No. This mater is not ordinarily used by cultivators.
  - 13. Q. What land did they irrigate?-Wasto land.
- 14. Q. (Mr. Bajaratna Mdlr.)—Government waste hand !- Yes, Government and Talukdani; it is not irrigated in ordinary years.
- 15. Q. (The Precident.)—They did pretty well through the famine P—Yes. In time of acute famine we seat these people from one place to another wherever these were water facilities.

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- 16. Q. How far did you take them ?-Thirty-five miles.
- Q. (Mr. Rajaratna Mdlr.)—Did the people of this part carry on irrigation?—Yes, during the famius. At other times, the water facilities being good, fodder and other crops are raised in the river side villages.
- 17. Q. (The President.)—Even in famius times?—Yes, with takavi advances.
- 18. Q. In the taluka of Dhandhuka was there any great distress during the famine?—Yes. People had to go to other places; now they have come hack and there were three or four inches of rain last year, and thay grew first class wheat and cotton, but unfortunately these crops were destroyed by rats.
- 19. Q. (Mr. Rajaratna Mdlr.)—Rats and locasts appeared after the famine?—Yes; the peculiarity of Chuval in the Virangam Taluka is that its brackish water is suited to barley and wheat. Practically harley is an irrigated crop and thrives well on brackish water.
- 20. Q. (The President.)—Is it intensely brackish?—We cannot drink it, but it is very good for cultivation; there are a good many big wells; they are of 8 kes; 6 kes and 5 kes.
- 21. Q. (Mr. Higham.)—Where do the people get drinking water from ?—From ponds and tanks, not from wells. They have get big wells, which cost one thousand to two thousand rapecs to haild.
  - 22. Q. The water is fertilising ?-Yes.
  - 23. Q. What do they grow f-Barley and juari.
- 24. Q. I suppose rice is grown?—Yes, in some parts. There are some crops which do not require sweet water. For instance, irrigated rice is sold cheaper than unirrigated rice.
- 25. Q. What, in your opinion, is the best thing to do for this district in order to proteot it against the ravages of another famine?—There are some tracts where well irrigation should be encouraged; then there are other tracts where nallah or river water might be stored and used in times of famine.
- 26. Q. As regards the storing of river and nallah water, you say there are some sites for this; do you say this of your personal knowledge?—Yes, I say it from my personal knowledge. There are a good many places where it is possible to store water from nallahs and rivers.
- 27. Q. On a large scale?—Yes, I think, on a sufficiently large scale.
- 28. Q. Large enough to provide storage for 400 or 500 acres ?—Yes, certainly.
- 29. Q. Do you think there are sites for storage reservoirs bigger than that?—Yes; but no recial inquiry has been made as regards irrigation facilities in Gujarat, because Gujarat has been immune from famine for nearly a century. Nobody has thought the subject out.
- 30. Q. You would make the irrigation of Gujarat the subject of careful study?—Yes; first begin with wall irrigation, and secondly utilize river water for irrigation. My opinion is that there are some places where it is possible to make reservoirs and collect water; a special Engineer should make surveys.
- 31. Q. I think surveys are heing made?—Yes. As for well irrigation, I am sure that it should be encouraged.
- 32. Q. How do you propose to encourage it?—The raies of Government are already very liberal. The Assistant Collector has power to give up to Rs. 1,500, and the Collector can give up to Rs. 2,500, so that if a man wants to build a well, he can take an advance from the Collector and build it; a well should not be subject to enhanced assessment.
- 33. Q. Is there anything further which has not already been done that might be done to encourage the construction of wells?—No; the rules are very liberal.
- 34. Q. (Mr. Muir-Mackonzie.)—Could the liberality be increased?—Not I think if proper care is taken to work the rules; they are very liboral, the officials have got ample powers. Under the rules, instalments can be suspended. No strict inquiry should be made and no extra assessment charged.
- 35. Q. You have hoard that the last witness said that if a man applies for advance, it would be five or aix months before he got his measy; that is too long?—Yes, that is the fault of the individual officers.
- 86. Q. Not the fault of the rules?—No; the rules are very clear and complete; they are very liberal. If any-

- thing, it is the fault of the officers; in many places Government directed the Mamlatders and Assistant Collectors to visit villages and pay the money on the spot.
- 37. Q. Do you think the rate of interest charged is any obstacls?—I would be inclined to reduce it. Even the present rate of 5 per cent. is rather hard for the oultivator to pay; if he takes Rs 1,000, he has to pay Rs. 50 s year, and that is too much. I propose that the rate of interest should be reduced to 2 per cent, and the number of instalments incressed to 20. If a mun is in a good position he would not like to be indebted to Government for longer than he can help.
- 38. Q. Why not be liberal and take no interest at all?

  —That would he a good thing.
- -39. Q. If we say "if you agree to pay this money back in ten years, you have it free of interest," would that have some effect?—I think it would have a good effect. The only question if you chargo even a small interest is whether it should be charged or not when the water in the well hecomes brackish or unsuitable for drinking purposes; and whether the instalments due in respect thereof should be collected or not. According to the existing rules Collectors have power to remit up to Rs. 100; but total remissions cannot ho made as far as I know.
- 40. Q. (Mr. Muir-Mackenzie.)—They can be made by Government?—Yes.
- 41. Q. (The President.)—One or two witnesses have said that the reduction of interest would eacourage the people to start making wells without proper consideration?—No, on the contrary my experience is that these who want to make wells are very skilful people. They are generally well-to-do and skilled cultivators.
- 42. Q. (Mr. Higham.)—Do you recommend wells in preference to canals?—Yes; canals on this eide do not give sufficient water.
- 43. Q. If they have sufficient water, then they are alright?—Yes, then they are better than wells; the Engineers must decide whether the water will be sufficient. The proposed Saharmati canal will save the rice crops if the Engineers see that there is sufficient water. My only miggivings are that the water will not be sufficient.
- 44. Q. (Mr. Ibbetson.)—What interest does the cultivator pay to the bania?—I think it varies from 9 per cent. to 16 per cent.
- 45. Q. But he can get money from Government at 5 per cent.?—Yes.
- 46. Q. Would be refuse to take at 5 per cent, and go to the bania and pay 9 per cent, to 15 per cent, ?—Yes, to save time and inconveciences.
- 47. Q. Do you think that the rate of interest prevents a man from making a well?—Not always. My idea is that well irrigation should be eucouraged and that therefore you should give money at a reduced rate of interest. In ordinary times 5 per osut, is a very low rats.
- 48. Q. Do you think that 5 per cent. provents a man from making a well any more than if he got the money fres of interest?—Yes; in cases where the cost is very great. In some places a well costs Rs. 1,000, but it might cost Rs. 700, Rs. 400 or Rs. 300. It varies according to the dapth. Where a well can he constructed for Rs. 200 or Rs. 300, the rata of interest is not vory material, but where a well costs Rs. 1,000 it is material. As a rule the bania does not loud money for well-sinking.
- 49. Q. Why not?—He will not; no village bania will lend a thousand ruptes to a cultivator.
- 50. Q. (Mr. Muir-Mackenzie.)—He will lend money for marriage expenses ?—Yes, but ordinarily he will not give more than Rs. 200. In the Viramgam and Dholka Talukas the cultivators who are prosperous can get from Rs. 1,000 to Rs. 2,000 for the marriages of their sons or danghters; but an ordinary cultivator, a kunbi or a koli or a dharula cannot got more than Rs. 200 from the village bania who is very careful about Isnding money.
- 51. Q. (Mr. Ibbetson.)—Have you got many wells in Gujafat !—Yes.
- 52. Q When do you think they were made?—Many were made before the original settlement.
- 58. Q. What did they cost then; do you know?—They cost less than they do now; oultivators worked among themselves; now they don't help each other.
- 54. Q. All the money that was wanted to make wells was horrowed from the banias?—blany had their own money.

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- 55. Q. Most of them had?—Yo; they constructed the wells hit by hit; they began with the initial work, then they did the work on the mst aide, and then they completed the work. Ordinarily it took two or three years to complete a well.
- 50. Q. How soon do you recover the first instalment of takari for wells.—The present practice is to recover after the well is constructed.
- 57. Q. Do you wait till then? Yes; the rules are very elear.
- 58. Q. Would you like to see Government charge only 31 per cent. interest?—Yes.
- 59. Q. Do you think that they would rather pay 5 per cent, than have a small charge assessed on the area trrigated?—Yes.
- (2). Q. (Mr. Rajaratna Millr.)—You say that the rules regarding taken are very liberal?—Yes; but the difficulty is in practi ally working them.
- cl. Q. How would you get over that difficulty?—That depends on the officer; a lary and Indolent officer may take six months, while an intelligent other would give the mency on the spot.
- 62. Q. Hon do you needs your akashia lands; are they assessed at a higher rate than jarayat land?—Yes.
- 63. Q. In your meuo, you say, "the scope of garden cultivation is large and deserves encouragement." In what way can encouragement be given?—These people may be encouraged to take takari and extend cultivation largely. There should be a little exertion on the part of the others to explain to the cultivators what the orders of Government are mid how far Government is willing to help them.
- 63. Replying to question 39, you say, "there are many spots along the conrect of several Gujardt rivers where, by means of a frame on perpendicular river panks, water 1 raised by bags "P—A good many places.
- CJ. Q. Is it possible to increase the number of such lifts:—It is not possible; where there are facilities, of course, people take water; if it could be arranged to give them flow irrigation, then it would be a good thing.
- 66. Q. In many cases it is not persible to give flow irrigation?—Yes; where there is irrigation they take water from the river; two men are employed to draw water, that is one style; then a good many people draw water by lifts; and it flow irrigation was given to them, it would be a good thing.
- 67. Q. (The President.)—Have you any experience of the use of steam pump-t-I saw a good many at work during the famine time.
- 63. Q. Do you think they are too expensive?—Yes; and then there are very few places where one can put up pump- and take mater.
- 62. Q. In Egypt you see hundreds and hundreds of them -I think steam engines will not do; the fuel costs ton much.
- 70. Q. In the case of lifts In the Gujarat rivers, is a water-rate charged for irrigation?—No.
- 71. Q. (Mr. Muir-Mackenzie)—What do you think of the proposal that Government should pay the whole cost of the well and take a moderate assessment on the land irricated by it?—An intelligent enhanter or a private individual might like the idex; but the ordinary englitator would not understand it; he would get nerrous lest the assessment should be enhanced.
- 72. Q. Suppose a well casts. Re. 500 and that Government should give the cultivator Re. 500, and where the cultivator formarly paid Re. 5 px acro. Government should say, "t e will not recover the Re. 500, but you will now pay Re. 10 on each acre irrigated instead of Re. 5 "1—That would he a very good thing.
- 73. Q. Wenld be be willing to gay the a littlemal assessment in the well for every—Yes; but the well must be constructed by the cubicators themselves and not by Governments. ernment, as that Government will not be sminded out of their own names and will not have to pur its 500 where the netlential bedone for its 300. Py proprinspection and powered in including the content that the while efect to far him
- 74. Q. Boyer strains many for wells in the critics under your own management, I mean talablaries at a Yes, his not in famine times, because, I think, it would

- not be possible to complete a well within a certain time; sinking a well in famine times is practically necless. Kiryaram.
- 75. Q. Do you give money out of the talnkdari estates?—Xes; for kachcha wells; a pukkn well cannot be completed in time.
- 76. Q. But they would give employment !-Yes; but I would not give large advances in times of some famine.
- 77. Q. Do you, in the estates under your management, give money for wells in ordinary years?—Yes, but generally the falus dars themselves build wells because they are the proprietore.
  - 78. Q. That Is like Government building a well f-Yes.
- 79. Q. If talukdars can provide wells on the lands of their tenants, why cannot Government hulld wells on the lands of their rayats?—The talukdars have tenants on their own terms who can be turned out at any time; ereas the rayals cannot be turned out.
- 80, Q. You know the Broach and Surat districts?-
- 81. Q. Do you think that the drains do any good?—Yes; but in some parts they have done harm. Of course they do good; but the danger of drains is that we don't know whicher other lands will be spoiled or not. They have to be carefully watched.
- 83. Q. (Mr. Ibbelson.)—During the rains?—Yes, water-logging and in some places scouring occurs. I have heard complaints that good land gets secured.
- 53. Q. (Mr. Muir Mackenzie.) Did you see anything of this during the last year;—Yes, in one place in the Virangam Taluka. I am not prepared to say whother it was due to the drains or to heavy rain. We are not in a position to give a decided epulon just new.
- 84. Q. Do you think that the drains earried off useful water this year?—This year there was no proper opportunity to test the subject.
- 85. Q Drains are ordinarily wanted to earry off water from mater-logged areas; this year the areas were not water-logged?—No.
- 80. Q. Did the drains carry off water which would have been available in this year of drought ?—I don't know; there was no apportunity
- to observe.

  57. Q. You think that the most useful kind of famine relief nork in the greater part of Gujerát would be the construction and repairing of tanks?—Yes, smell tanks for irrigation.
- 83. Q. Not water-supply tonks so much as irrigation tanks?—Water-supply maks are made ordinarily by the Local Boards. In times of fomme local land tanks and village tanks carry no distriction. They are all made by Government in times of famine. It would be much better to dig irrigation tanks than other tanks in times of fomme.
- 59. Q. You would give preference to strigation tanks in times of famine?--I would.
- 10. Q. Don't you think that tandhe or long bunda would form useful famine relief works !- Yes, tunde don't
- 01. Q. So much the better?-In some places they may do good.
- 92. Q. (The President.)—Are you opposed to largo inks?—Yes; unless they can be made to give water in tanks ? famioe time.
- 03. Q. You consider that small tanks are more metal. Was there more water in small tanks than in large during the famine?—Yes; small tanks are useful for irrigation purposes; there are some tanks which are not useful for irrigation purposes; In ordinary years there would be no irrigation from them.
- 91. Q. Not even rice f-Yes, rice cultivation is impossible without a large supply of tank water when late mins fell and other crops don't want water. If you want large lonks, the existing irrigation tanks might be enlarged.
- P5. Q. (Mr. Mair-Mackenzie.)—You would enlarge the existing tanks?—Yes.
- 96- Q. (The President.)—I do not fully understand what you say about the irregation tanks?—The new tank made during the lamine that I have seen ate of no use in ordinary times for irrigation.
- 97. Q. (Mr. Muir-Mackennie.)—Because the localities in which they are situated are unsuitable for irrigation

Mr. B. Kirparam. 4 Dec. 01. purposes?—Yes, but there are existing irrigation tanks which may be improved and extended and made larger and would be able to irrigate a large area of rice.

98. Q. (Mr. Ibbetson.)-You would not have Govern-

ment make wells in private heldings?-No; Government should not undertake the building of wells.

99. Q. You do not think that would be a good plan?—No; there are many objections to it.

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WITNESS No. 17.—RAO BAHADUE HIMATLAL DHIRAJBAM, A. M. J. C. E., President, Ahmadobad Municipality.

Answers to printed questions.

The following replies refer particularly to the Alumadabad District, with which I was connected for ubout ton years. I was a member of the Public Works Department for about 35 years, have served in all the districts of the Northern Division in various enpanties, and was Executive Engineer of the Alumadabad District for about four years.

Irrigation in the Ahmedabad District may be classed under the following heads:-

- (1) Wells
- (2) Water-lifts, called Dhekndis, from rirers, nallahs, streams and other sources.
- (3) Tauks, including bunds, in the Sanand, Viramgam and Dholka Talukas.
- (4) Canals.

There are in all 13 to 14 thousand wells and Dhekadis in the Ahmadabad District, which irrigate about 50,000 acres. About 25,000 acres are commanded by taaks; and the present causls may be roughly assumed to have a capacity of irrigating about 20,000 acres. Thus wells, tauks and canals command in all about a hundred thousand acres; or about 5 per cent. of the total calturable area of the District may be said to be protected by the existing irrigation facilities. Except a few, all the wells, and a few of the tanks and bunds, are prirate property. All the canals belong to Government, who control the distribution of water from them ander cortoin fixed rules, and charge irrigation, revenue at fixed rates per acro irrigated, varying according to the crop; but this rule is not applicable to lands on the Khari sluices, which were assessed at the time of the survey cettlement upon a consideration of the water adventages they obtain from the river. Remissions of the waterate are given when the crops watered from the Hathurnti and Khari Cut canals anter from an insufficient supply. There is ordinarily a demand for water during the sauthwest monsoon; and it occasionally happens that, for want of one or two waterings in September and October, the rice crop suffers considerably. The distribution of water from the tanks is made by the cultivators themselves mader the general supervision of the rorenue authorities. The water-rate for tanks is assimilated with the land revenue, and collected by the rillage officials in lump without reference to the plots irrigated. The soil is, for the most part, sandy, with the exception of large patches of black ceil in the Dhelka, Dhandluka and Virmugam subdivisioes.

The number of weterings required for the several crops vary according to the amount and season of the rainfall, as also according to the nature of the soil. If the minfall is deficient, rice requires, between July and October, 5 or 6 waterings after transplantation; wheat 7 to 8 waterings from Norember to February; and Jowari (as u hot weather or Hari crop) about 6 to 8 waterings from March to May. Sagarcane requires a very large quantity of water, umounting to as many as from 25 to 30 waterings during the year.

Small tanks constructed in black soil, which is light in this District, rotain water; and carthen dams, not exceeding 12 to 14 feet in beight, oon be safely constructed without masoary cers walls. As a rule, whether the soil be red or black, there is always a demand for water in the south-west monsoon for the rice crop; and I um of opinion that in projecting new or repairing old tanks, the nature of the soil, whother black or red, need not be a matter descriving any special consideration in this district. The cultivators ore already beginning to appreciate the adrantages of irrigation; and, as Executive Engineer, Pablic Works Department, I came across a number of instances in which they expressed their willingness, by all means in their power, to help irrigation schemes.

The only existing Government irrigation works in this District are the-

Hatbmati Canal, Khari Slaices,

and

Khari Cut Caual.

These, however, cannot be much depended an during reasons of drenglit. Proposals for increasing the sapply in the Khari from the Bokh near Parantij are under consideration for several years; and if they are carried out, a large portion of the Daskrei Taluka in Ahmadabad and of Matar in Kaira will be greatly beachted. There is any amount of culturable lond available in this District, but not now under tillage, and the caltivators are skilled and industrious. House all water facilities that could be provided are likely to be utilized to the greatest advantage. I am not in favour of the Sabarmati Canal, as, owing to the sandy untire of the seil, there is likelihood of a considerable waste by absorption; and I do not think the project could be made financially remanerative.

In my opinion, more satisfactory results could be secured from caucis of small lengths from the Meshva and other rivers. Some dialonge channels, combined with irrigation facilities, are required within a few miles of Abmadabad, as, in years of anaple manfall, crops suffer from excessive, and, in years of senaty minfoli, from deficient, water-supply.

In parts of Dhandhuka, Dhelka and Viromgam, similar works are also mach needed; and if they are properly projected after due enquiries, the district will be greatly benefited. Such works, affecting only one or two Talukas, might be carried out with advantage from Provinciol revenues. At present no irrigation works are constructed or maintained from other than Imperial Funds.

No now irrigation tanks or bands have been receutly constructed. All the existing works ure of a very old date; and by G. R. No. 125 W. T., dated 15th September 1892, Government have already ocknowledged their responsibility to keep them in proper repair. Small sums are being spent from time to time for their maintenance, but in only a few instances, have therough repoirs been unde. It is, therefore, difficult to estimate, with any degree of accuracy, the cost of repairs per acro irrigated. The total number of tanks is about 1,200, and the area dependent on them about 25,000 acros. The protective value of these works will be greatly enhanced by restoring them to their original condition, as soon as practicable. I would also construct new bunds where natural facilities exist, so as to increase the irrigable aron as anuch as possible. I do not think such works can be undertaken on any large scale by private agency. Besides, the matter is one of Provincial interest; and I do not think Local Fands should assist, to any material extent, in the improvement of other than rillage tanks used by rillogers and cattle for washing and driuhing purposes.

## Wells.

The total namber of wells in the district is 13 or 14 thousand, which, in years of drought, irrigate about 50,000 cores. In my npinion, the construction of wells should be stimulated by all possible means, and as they afford a really effectual protection from drought and famine, sufficient inducement by liberal advances raight be given for their construction in large numbers. The people are fally alive to the protective value of wells from time immemorial. Thus, there is errory hope of their coming forward to construct them, provided special oncouragement and assistance on the chove lines are given by Government.

The average depth of wells in the Ahmadabad District may be put down at from 30 to 50 feet, and the average cost of a well about Rs. 600 or 700. A well, on an average, irrigates from B to 5 oeres, and if kept in proper repair from time to time, it may be expected to last over a hundred years. In most cases, the supply is from percolation which is liable to fail in years of drought. Some of the welt are percaniul. In some parts of the district, viz., partions of Dhandhula and Dholka, sweet woter is scarce and the soil has u tendency to become salt.

All throughout the district, well water is largely used for the purposes of sugarcane, tobacco, vegetables, etc. It is usually raised by meens of two kinds of mots called

"Sundhia" ur "Ramia" Kos. In a year of sufficient rainfall, irrigation does unt make any great difference in yield; but it enables two larvests to be obtained, and ulso year, one is changed the inverse to be continued, and used the growing of valuable crops. In years of scanty rainfall, however, it is of great value in earing crops. The annual net value of the produce per sere is about the same in years of number rainfall as in years of searty rainfall, with irriga-tion,—the cost of cultivation being more in the latter

No special difficulties are encountered in most pasts of this Instrict in the schedum of a spot far wells; but in parts where the soil is saline, it is difficult to estimate whether water would be found sweet are otherwise; and, for this purpose, the selection of the spot is under after examination of the depth of neighbouring wells. Illinduviters have land down certain rales in repart to the selection of suitable sites for wells. According to them, water is unit with at a reasonable depth below a site where rayan, Minuscops indics; tierra, Dierpyros montone; Sando, Eriod-andro untractuasum; jamlude, Syryganum Jambolianum, and Kerdo tries grow. The growth of Haridi graes on any spot in the dry weather is also a snio sign of water being fuand there not far from the surface. Sometimes, in places, a stratam of quickend is met with In sinking wells, and the increases the difficulties of sinking. I think the Government would do well to supply the use of boring tools in cultivators with expert advice for their use. A few trial borings mey also be undertaken by Government in different tracts to ascertain the quality of the water, as well us the depth ut which it is obtainable. I am against Government undertaking the construction of wells. As a rule, I am not in favour of Government undertaking wurks, the value of which they are personally interested. Huwever, it would be more satisfactory if a supervising slaff is maintained by Government to ee that such work is praperly done.

Grants-in-aid may be given for the construction of wells on emitable terms; and this, in my opinion, ought to No special difficulties are encountered in most parts of

Grante-in-aid may be given for the construction of wells on enitable terms; and this, in my opinion, ought to induce people to sink a very large number of wells.

Properly constructed wells alone are generally used for irrigation. Tempurary wells are not so largely used, and do not afford much protection against droughts. I think it would be better to provide for a sufficient number of pakka wells in normal years, so that the same may be available in years of scanty rainfall or drought. In my opinion, a year of scarcity is about the most unfavourable time for sinking wells; as the people, at each times, being much in want, are charry in spending, being not hopeful as to the result.

To become ahis rice crop, it is usual, fur n cultivator who has no well, to make n small hollow in a convenient part of his field where rain water gathers; and this is carried into the rich heds by u water-lift, Jhilu, when the later

rains fail.

There are already about 13 or 14 thou-and wells in the District irrigating about 50,000 acres; and every additional well is a lilewing, as being of great princetive value in times of famine. In fact, I consider wells to be the most reliable source of supply in years of drought.

In Virangam and Klaragheda, berings were taken at different times to a depth of about 150 feet; but the result was not estisfactory. However, in my opinion, further experiments are desirable, and should be carried out in all parts where difficulties are experienced in obtaining a sufficient and wholesome supply of water.

Drainage.

A few drainage works have already been carried out in paths of Virangeon and Serand, but much still remains to be done in this direction, act only in the Virangeon and Sevand. Taluhas, but also in Duella and Dhandhula. Large tracts of land in the district remain uncultivated ewing to their waver-logical condition; and it is to the interest of all concerned to have all such places thoroughly transical, and preparates taken in make them suitable for regionizeral purposes. In constructing drains, provided all such and analysis and inighting the supply in ordinary years for clining he tanks and inighting the supply in ordinary years for clining he tanks and inighting fields. The above-reached drainage works are also necessary to improve the calarial condition of the surroundings, due to stagmatim of water. Funds for this purpose should be provided fact: frostrein's receives, especially as such works are allfiely to readly in an inverse of revenue by reacting relinquished that and by inducing cultivators to take up fields already given up

Tanks.

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Tanks are supplied with water from their own catchment areas. Some of these have, of late in some caves, been taken up for calification. Water from such tanks is distributed by the cultivators themselves. In some of the larger tanks, pipe outlets have been provided. In sure, water is drawn by lifes. The supply is not made perennial by any special means, and the required quantity of water is drawn from the tank so long as it is ubtainable. It is difficult to say what amount of rainfall is enficient to fill tanks. In 1900-1901, with a fall of about 10 inches, some of the tanks were only partially filled; while, thus year, with a rainfall of ubout 10 inches, the tanks are practically dry. There are very few tanks in this district from which two crops are entitivated. Rice crops are grown on land commanded by tanks, and the increase in the value of the produce of land in such cases may be put down at about 10 to 60 per cent. People do not use much tank water fur irrigation in good years. In years of reinty rainfall, their uses is to the extent available; while, in years of drought, owing to insufficient supply, un crops thrive satisfactorily. Tanks are supplied with water from their own catchment

How far a teo late commencement, ur a too early cession, of the supply affects the value of irrigation depends upon the timely transplantation of the socilings, etc. If the commencement of the mension is late, the lajti error would fail, but the rice crop would thirt; and, in case it is late for both erops, Rabi would be put in. A too early cossation of the mansoon would affect rice, as well as liabicrops; and artificial irrigation, in these cases, would greatly help them.

The cultivators generally saw certain kinds of crops when it rains during certain constellations or Nalshatras, and me under the impression that, when this is done, the crops thrive. When sown at other times, they are believed in fail through some reason or other. How far their ephilom about the matter talkes with the netual facts is a question that needs verification in the light of neutral experience. In years of seanty rainfall, folds with wells, or commanded by tanks, arigate respectively from the wells or tanks. The number of waterings vary from 2 to done, the crops would seriously suffer. Irrigation may be said to give approximately an increase of about 40 to 50 per cent. In the total annual value of the rainfall; and if this is not done, the crops would seriously suffer. Irrigation may be said to give approximately an increase of about 40 to 50 per cent. In the total annual value of the produce per nere. In years of drought the crops fail, as the tanks, etc., on which irrigation depends give little of no supply in each years. All petty expenditure, necessary to bring the water to the field, is incurred by the teanth, who expects nu recomposent; but, when the expenditure is heavy, it forms the subject of a specific agreement between the tonant and the landlord. The tanks are generally repaired by Government. It is difficult to give the annual cost of repairs per acre, as such cost is comparatively more in semall tanks irrigating only a few acres, and less in large lunks having extensivu sreas dependent un them. In a majority of cases, tanks would require silt clearances once in 20 or 25 years; and the average nunual cost may be roughly put down at about une-third of the water revenue derived from them. There are very few, if any, private tunks; and I du not consider it desirable to encourage the construction of such tanks. No special measures seem to have been hitherto adopted for the purpose of preserving the uniginal depth of tanks. There is no distant or show what changes have occurred in their body, e The cultivators generally saw certain kinds of crors

Next to wells, tanks are useful in affording protection from famine, and it is very desirable that they should be maintained in a thorough state of efficiency. There are about 1,200 tanks in the district having about 25,000 neres of land dependent on them. If tanks are kept in proper repair, as directed in Guvernment Resolution No. 125/1473, dated 15th S. ptember 1692, above referred to, irrigation will be greatly benefited. In a majority of cases, water is drawn from tanks for rice crops; and as the late raise generally fail, two or three waterings are required to bring the erejs to maturity. The preservation of tanks in proper repair would also, to some extent, us-ist in securing a good supply of water in the neighbouring wells.

A water-rate on lands dependent on tanks was fixed at the time of the Entrey Fettlement, and it is collected on the whole area assessed, whilout reference to the area actually infigated.

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#### Canals of continuous flow.

No canals of contionous flow exist in this district with the exception of the Khari, the assessment of lands depending on which is included in survey settlement rates. Increase in the value of produce varies according to the natore of the soil, the supply of water available, and the mode of preparing and cultivating the field; and, in years of normel rainfall, this may he roughly put down at about 1½ times. In some cases, two crops are put in, the first of rice and the second of gram or wheat in cold weather, or of Jowari in the hot weather. In years of scanty fainfall, there is hardly any increase, while, in a year of drought, it would depend mostly on its intensity. In years of scanty rainfall and drought, the crops are more liable to be attacked by rats, whiteants, Khapri, as also by a number of diseases; and this fact deserves to be taken into consideration in forming an estimate of the average return from the laud. In this district there are no private canals. Government is the sole proprietor, and charges depend on the area irrigated, except in the Khari Sluico District.

All expeases of a petty natoro are, as a rule, borne by the teaant; bot, when heavy expenditure is desirable or necessary, it forms a matter of special agreement between the landlord and the tenant. In places where water is allowed to stagaato for a considerable length of time, salt efflorescence is formed. Too frequent irrigation produces this salt efflorescence called "khar." With irrigation facilities, a lorge area of dry crop land could be converted into rice land, which is a decided advantage. Rice fields are protected by high banks, and only very low-lying and badly-drained fields become saltish. Therefore, if the cultivatora are offered sufficient inducements to take interest in their holdings, they would themselves do all that may be found recessary to prevent the damage caused by saline efflorescence, etc. Irrigation is being made in the Khari Sinice District for a very loog time. Before the construction of the present sluices, earthen dams were thrown across the river from time to time. Salt land may be roughly put down at 1st in the Khari Sluice District; shout 1st in the Khari Cut Canal (which was made in 1880); and nheat 1st in the Hatmoati Canal which is about 25 years old. These figures are only approximate. It is generally believed that only laods which do not completely dry up, become saltish.

## Canals of intermittent flow.

In the case of the Hathmati Canal in the Frantij Talnka, a wair, about 1,000 fest long and 22 feet high, is built across the Hathmati river near Ahmadangar in the Idar State, and water is turned into the canal as required from time to time. At the site of the Canal Head Works, the weir hos a drainage area of 520 square miles. The Hathmati Canal, 20 miles long, is completely bridged and regulated. Its first three miles pass through the Idar State. The discharge diminishes considerably as it reaches the tail of the canal

In the case of the Khari Cut Canal, a weir is huilt across the Khari river near Ranpur about ten miles north-west of Ahmadabad; and water is thraced into the canal, and brought as required from time to time, by means of regulating works which are duly provided. Water is distributed to fields by means of hranch and field channels and sinice gates. Water is assully required from 3½ to 4 months, i.e., from July to October. In years of scanty rainfall or distributed the fields require more watering, and it is with difficulty that some fields get even one crop, as the supply of water foils. Canals of intermittent supply give one crop when they run full during the Kharif, and two oreps, when they run full during hoth Kharif and Rahi seasons; and it is only in years of ample rainfall that it is pessible to secure two crops for some fields,—those inconveniently situated giving only one.

The ohicf Storage Reservoir is the Chandola Tank within four miles of Ahmodabad, from which water is distributed to fields as required. The Chandola Tank is fed from the following two sources:—

- (1) From its own catchment area.
- (2) From the surplus water of the Khari, which is allowed to run through the Khari Cut, after satisfying the wants of the Kallambandi villages, which have a prior right to the use of the Khari water. The supply has, of late, been increased by the surplus water from the Hethmati Canal, which is brought down to the Khori through the Bhojva Nallah branching off at the 5th mile.

The value of irrigation is considerably affected by the too late commencement or too early cessation of the min-

fall in case it fails in September and October, when water is much needed for the moturity of the crops. Nowhere in the district is coltitation solely dependent on artificial irrigation, which, in all cases, is only anxilisry to and in aid of the natural rainfall, and ascful for the production of the more valuable crops. So long as water is available from a causal or tank, wells are not used: hut when the supply from an irrigation work runs short, well water is ansed when required for the matarity of the crops. When need when required for the matarity of the crops. When the rains are late, well water is used for seedlings. The value of crops raised in any one year can he only comparatively calculated, as it depends on the market rate whose fluotuations depend upon a varisty of causes. In a normal year, an irrigation field may he expected to yield about 40 to 60 per cent. more than ac unirrigated field. Though there have now been a succession of two or more bad seasons, the present prices of grain are act much above the normal.

There are no private irrigation works in this District, and the following rates are obauged for the supply of water from Government Canals:—

(On the Khari Cat Caval.)

(On the Maria Cat Caval.)

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The rate is collected on the area actually irrigated, and in all cases of deficiency of canal water, remissions are given on a consideration of the extent of the crop failure. When water is supplied to land already assessed for water advantages, the amount so included is deducted from the charge leviable according to the scale given above. The canals are all auxiliary works and maintained from Imperial Funds, and cost, on an average, from Rs. 2 to 3 per acro irrigated. No change in the present system seems desirable in the present condition of the Province. Neither do I consider it advisable to encourage private outcoprise in the matter of important Inigation Works.

## General.

There seems to be no obstocle to the extension of Irrigation arising from sparsity of population and insufficient sapply of eatile. Dung is chiefly used for manure, and is not unalable in required quantities. The soil is, for the most part, suitable for irrigation. In some cases, the same field is irrigated from two or three senrees. The empty of water is precarions, and at present de pends mostly on the rainfall. Cultivators are, as a rule, poor and bove little or no oredit, and are therefore not in a position to find funds for the cultivation of rich crops. Fear of gahanced assessment also, to some extent, deters cultivations from improving the soil; and it would be an encouragement to them if Sanads were granted to the affect that no enhanced rates will be charged in future settlements on account of euch improvements.

In my opinion there should he liheral rules ahont remissions and recovery of Government daes, and no hard-and fast line used be adhered to as to dates of submission of applications for remissions, etc. When Government is satisfied of even a partial failure of crops in any part of a district, arrangements may he made to give early notice of the intentions of Government, and allow reasonable remissions to all affected therehy. Cultivators are generally illiterate; and it would, I think, greetly improve matters if they are ussured that, in cases of failure of crops from causes over which they have no control, fair remissions will, as a matter of coarse, be granted by Government.

I do not think the sxtension of Irrigation is likely to injute unirrigated lands by attracting oultivators to the irrigated tracts, because the Gnjarát cultivators stick to their homes in particular localitios, and, being very conservative by nature, and averse to changing places of residence, etc. Knrther, orops of all sorts, both irrigated and unirrigated, have a demand in the market; and every man has his own ways of thinking and liking. Consequently, there seems little or no chance of unirrigated parts heing neglected. Irrigation is yet in ite infancy in Gnjarát, with much room for its extension; and though cultivators do not as yet fully appreciate its advantages, I have now and then come across a number of inctances in which they expressed their willingness to cron give up a few acres of land free of change for extension of Irrigation. The exact information in regard to these cases may, if required, be traced from the Executive Engineer's records. I also remember several instances in

which coltivators applied for additional channels, and further facilities for irrigating more land.

ther facilities for irrigating more land.

In conclusion, I beg to be allowed to express it as my oplaien that though, fortunately, this district, owing to the fertilizing anture of its soil and the enterprise and andustry of its inhabitants is not so often liable to famine as other parts of the Presidence, yet, as we have had a severe famine and a continuance of three successive bad seasons—n atrice of things unknown within the last 50 or 60 years—it is very desirable in the interest of all concerned, to take timely and effectual steps to prevent a recurrence of the sadexperiences through which the province has been passing. From what I know of the rivers, ood the character of the soil of this district, I do not think canol irrigation can be profinely undertaken on an extensive scale. However, I soll of this district, I do not think canol irrigation can be profitably nudertaken on an exteosive scale. However, am sure that with a careful examination of the water-bearing resources of the country, much can be done in the shape of minor cause and drains which would afferd material protection to the cultivators in years of scauty as well as abnormal minfall.

Another important work to which I carnestly beg to invite the attention of the Commission is to increase the present supply in the Khari river from the Bokh, and all other available asurees. The undertaking of necessary droics in Dhandhula, Virangam and blokks, where large tracts remain uncritivated owing to their water-logged condition, also deserves serious coosideration.

The most effectual safe-guord against famine is, in my mpinion, wells; and Government should, I think, do all in their power to increase their mucher. I do not, for a

moment, mean to suggest that wells should be built by H. Dhiroj-Gorernment; but cultivature should be encouraged to sink them on their own nerount, with the help of liberal takary advances on easy terms, and of exemption from increased assessment. In fact, they should be assured that improvements, and increased profits due to their enterprise, industry and skill, would, in no case, he tased. More facilities may have be given by way of talent. also be giren by way of takarl.

Irrigation Tankr.—A large number of these have more or less, salted up. They should be restured to their original coodition, and provided uith necessary plpe outlets, maste weins, Ac. Government oro bound to keep the lanks in proper repair, because collimators have been charged for water at the time of the Survey Settlement.

A thorough recommissance of the country may be ordered with a rice to the finding out of saliable places for large bonds similar in character to those in the Dholka and Sanand Talekas.

Sanand Talekas.

The above proposals if approved by the Commission, will, I am sare, prove an effective protection against famine, which would then, in coorse of time, le a thing of the past. I would not delay the undertaking of the clove works until another year of searcity recent, but recall formulate plans and start the former as seen as possible, so that, within the course of the next few years, considerable progress might be made and the prespectity of the country sufficiently assured to encourage further expenditate on them. All such works, other than wells, should, in my opinion, not be left to private enterprise, as they require un amount of Engineering skill and affect rorlous conflicting interests.

- 1. Q. (The President.)—You were for a long time in the Public Works Department ?—Yes.
  - 2. Q. About 35 years?-Yes.
  - 3 Q. Do you know Gujarat very well ?- Tes.
- 4. Q. How long is it since you retired?—More then three muda-half years ago. I retired in August 1898. Since then I hore served for three years in the Improvement Trust, Bambay; I retired from there only six months ago and am now in the Ahmadabad Municipality.
- 6. Q. You have sent in a long themorandum which is full of important information. You say in it "ourthen dams, not exceeding 12 to 14 feet in height, can be safely constructed without measurery core walls" would you not make them higher?—Aot in black soil without n mascory
- core.

  6. Q. Have you repaired many tanka?—I have repaired a number of irrigation tanks, but have not made now tanks. I repaired tanks which irrigated over 50 nores because only such tanks were under the Public Works Department. I repaired a lot of them.

  7. Q. I understand that Government is supposed to repair all tanks?—Till 1892 there was a rule that all the tanks should to repaired, but since then all tanks has been usele, and an order has issued that all tanks giving more than a certain rescause should be repaired by the Public Works Department.

  8. Q. I understand that the vidagers who have small
- S. Q. I understand that the vidagers who have small tanks consider that they have a right to demand that those tanks should be repaired by Government f-Xes.
- 2. Q. Yon say "the only existing Government Irri-cation works in this district are the Hathmatl Canal, Khari Sluices and Khari Cut Canal."—Yes.
- 10. Q. Were you employed in the preparation of the Khari project?—No, but I had suggested during my time some improvements to the Khari.
- 11. Q. There is a reservoir for the Buthmati Canal in the I'dar State !—Xcs.
  - 12. Q. Do you know the Sabarmati Canal ?-Yes.
- 13. Q. In you know if there is a sufficient catchment area—Inring the resease of ordinary min, is the reservoir goine full f-Yes; in ordinary times it is full.
- 11. Q. To you know if after extraordiousy rain it over-
- 16. Q. Po you think there would be any difficulty in raising the write I think there would be no odvactage in
- 16. Q. Why f-Breams in the first place the cost will be very great and the return will be disprepertionate to the cost.

- 17. Q. You say that "proposals for increasing the supply in the Khatl from the Pokh near Parintij me under consideration for several years, and if they are carried out, a large portion of the Daskroi Talaka in Ahmodabad, and of Matar in Knira will be greatly benefited." Have you studied that question ?—No. I had an idea that some changes were proposed and I had to go through the project and make certain estimates.
  - IS. Q. Do you think it is a good project ?-Yes.
- 10. Q. You go on and say "there is any amount of colturable land available in this district." Why was it not thin advantage of—I learn from Mr. Beale's report that irrigation was not tried there. There ims not been very much irrigation?—No.
  - 20. Q. Is all the water used that comes down ?-Yes.
- 21. Q. Is it used for rice?-You roostly for rice, wheat nad grain.
- 22 Q. How long do these canals run !- Throughout tho year.
- 23. Q. In a year of drought is there water?-No, I think not.
- 21. Q Hore you heard whether any aurrey has been made of the whole of the catchment bosin of the Khari to see whether they could make a storage reservoir?—I do not know.
- 23. Q. You say, "in my opinion more satisfactory results could be secured from canals of small lengths from the Meshwa and other rivers." How long does the Meshwa ran F.—All the year round; I don't know the discharge.
- 26. Q. You say "in my opinion the construction of wells should be stimulated by all possible means, and as they afford a really effection protection from drought and families. nstord a reolit effectival protection from drought and sanine, sufficient inducement by liberal advances might be given for their construction in large numbers." Practically what you propose to do is to make the terms easier than they are now?—I think people may be given advances on reasonable terms in order to save themselves from any loss; the advances may be recovered by instalments in twenty or thirty years and rate of interest should be 5 per cent.; if you can reduce it so much the latter; the smoller it is the better; the advances may be given in iostalments os the works progress. works progress.
- 27 Q. How is it done now?-I think in two instalments; I do not know.
- 24. Q. What do you arguest f.—Give them small sums I would give them advances from time to time, but there should be every facility for payment, and there should be no
- 22. Q. Do you think delay provents people from securing udvances?—Yes, it does.

- H. Dhirai . ram.
- 30. Q Yon are against Government eenstructiag wells P-
- 31. Q. Because the cast would be greater than the cultivators could do it for ?-Yos. 4 Dec. 01.
  - 32. Q. Is there any difficulty about drainoge of water-logged lands ?-Yes; the land has always been waterlogged.
  - 33, Q. There is no more land going out of cultiva-tion?—I do not think so, there may be a little in a few places.
  - 31. Q. Do you see salt on the surface?—No; I do not think it is due to irrigation; I think there must be some salt in the soil. Under irrigation a much cropped soil may become saltish; otherwise I do not think it does so.
  - 35. Q. Do you think there is any reason to suppose the efflorescence is getting worse than it used to be !—I do not think so.
  - 36. Q. Havo you ever heard of the effects of drainage upou land which is water-logged—Are water-logged londs improved by drainage?—Yes.
  - 37. Q. There are a good many drains, I understand P—One drain was cut in the Dhelko Taluka after 1872, and, on the whole, we found it useful.
  - 38. Q. Have you heard complaints against them f-I have not; there are not many drains in this district.
  - 89. Q. Yon conclude your memorandum by saying "I do not think canal irrigation can be prefitably undertaken on an extensive scale." You don't think one could connect the existing tanks in Almandand by canals with rivers so that you can fill up the tanks by flood?—Yes, we may in places if proper arrangements are made. Inquiries in this direction are desirable.
  - 40. Q. (Mr. Higham) -Does rice require 5 or 6 waterings between July and October !-Yes.
  - 41. Q. Is it advantageous to encourage rice cultivation under tanks which are liable to fail?—Yes; generally they help to assist the rice crop.
    - 42. Q. Do you know this district well ?-Yes.
  - 43. Q. Would it be possible to arrange to fill a large number of tanks by means of channels taking off from the rivers ?-I think that could be done.
  - 44. Q. From what rivor or rivers?—The Meshwa and Khari rivers.
  - 45. Q. I suppose these rivers run dry every year?—Yes; but the Sabarmati does not rundry. During the rains no rivers run dry. It depends upon whether there is sufficient
  - 46. Q. The channels would not rnn dry in the rainy season?—In some of the rivers they would.
  - 47. Q. The spill channel would be very deep?-Perhaps; surveys would be required.
  - 48. Q. Are the Sabarmati banks too high?-Yes, abero Ahmedobsd.
  - 49. Q. Have you ever seen tanks filled from the river?-No.
  - 50. Q. (Mr. Ibbetson.)—You say you do not think that the Local Fund could assist unterially in extending irrigation?-Yes.
  - 51. Q. Becanso you do not think it fair to spend Local Fund money on irrigation ?—Yes.
  - 52. Q. Sappose Government were to find the money and nliet the net revenue to the Local Boards, would they he a suitable agency for making small tracks and reparing them P—I think it would be better to remit the revenue on those small tanks, which are paying under Rs. 20 or Rs. 30. I think the people would rather repair the tanks themselves than pay taxos.
  - 53. Q. Do you think the people would do that?—If they know that the water-rate was to be remitted I think they would.
  - 54. Q. If the assessment is taken off, do you think that they will keep the tanks in order?—Yes, I think so.
  - 55. Q. You think that would be botter than giving the Local Boards the revenue and asking them to keep the tanks in order? - Yes, otherwise there will be great bother and the return will he very small.
    - 56. Q. In the ease of these very small fanks !- Yes.
  - 57. Q. You say the people do not use much tank water for irrigation in good years ?—They take only one or two waterings whou there are late rains.

- 58. Q. You mean not much water is ased ?-Yes.
- 59. Q. They only want water when it is of great impertance to have it ?-Yes.
- 60. Q. And then they are ready to pay a substantial rate for it  $\ell$ —Yes.
- 61. Q. You say the average annual cost of repairing these tanks is about one-third of the water revenue; that seems a high propertion?—What I mean is this; suppose we have a revenue of Rs. 300 and we spend Rs. 100 annually, the tanks can be kept in proper order.
- 62 Q. Would they require Rs. 100 every year for repairs?—No, I do not think so; it may be every 20 or 30 years. The tank will be silting and you would have to ınako eertain repairs.
- 63. Q. Every 20 or 30 years you have to spend Rs. 2,000 or its. 2,500 in clearing the tanks !—I think so.
- 64. Q. I see that the rates on the Khari are double the rates on the Hathmati Canal ?—Yes,
- 65. Q. Why is that ?—I do not know; that was settled before I came here. I think the soil is not so rich as the soil on the other side—it is a poor country.
- 06. Q. You say that onlinneed assessment deters cultivators from making wolls? - I do not know whether the people fully understand the matter.
- 67. Q. Has anything been done to make thom doubt that the necessment will not be enhanced ? I am not quite certain; but the general impression is that the assessment will be enhanced.
- 68. Q. They could be given sanads Would—that be a good thing?—Yes.
- 69. Q. Supposing you tell thom that the revonne is enhanced on account of the rise is prices, do you think they will accept that explanation as true?—That could be explained, but I have doubts about the general rules.
- 70. Q. Do you think the explanation would do?—Yes; it may be tried.
- 71. Q. You are in favour of Government building wells on private lands?-No.
- 73. Q. Do you think the Government can build wells as cheaply as the cultivators !—I do not think the Public Works Department can build them as cheaply as cultivators though they could baild them better.
- 73. Q. (Mr. Rajaratna Mdlr.)—I find that the area irrigated in 1884 is 28,000 and in 1886 the actual irrigated area was 35,000. Is the decrease due to deficiency of supply or to disioclination of the people?—We utilized all we could get.
- 74. Q. You utilized the whole of the water available?-Yes.
- 75. Q. Yon say there are orders that only tanks irrigating over 50 acres are to be under the Pablic Works Department?—Yes; at present they are under the Public Works Department.
- 76. Q. And those irrigating less than 50 acres?—They are under the Rovenac Department.
- 77. Q. The majority of the tanks are irrigating less than 50 neres ?--Yes.
- 78. Q. More than & P -- A little more than 1; that was the figure when I was thoro.
- 79. Q. In your written answers you refer to the drainage works at Viraugam and Sanand?—Yes.
- 80 Q. Have you heard complaints in some parts that they have proved injurious to the cultivator's lands P—No I think they serve their purpose very well. One drain was made in Virangam and another in Dhanduka; there are no complaints about these.
- 81. Q. Some of the witnesses say that the rayat went the length of filling up these drainage channels?—That may have been the case since I left the department.
- 82. Q. (Mr. Muir-Mackenzie.)—Do you know any thing of the Chandola tank in which a charge was made for extra water?—Yes; the question was started in my time.
- 83. Q. Will you kindly state the virenmetances of the case?—Before the Chandela tank was built certain lands were assessed with water-rate; then in my time certain people took water from the tank for the purpose of het weather crops, and I wanted to charge them a water-rate because the original enpacity of the tank was considerably increased at the cost of Government. Then we received some petitions in which it was stated that we wore

not entitled to charge an extra water-rate as the extra capselly of the tank had been already assessed, with the

84. Q. (Mr. Illetern.)-You were not allowed to raire the water-rate :- No.

85. Q. On account of the improvements !- Yes.

SG. Q. (Mr. Mair-MacLensie.)—Were Government informed?—I think the matter went lo Government; I sent all the papers to Government.

[Mr. Ibbetson.—It is a consultated assessment?

-Mr. Muir-Mackenzei.—Yes; a consolidated assessment caunot be altered.]

87. Q. You said that you would like to let water-rate go on small tanks and leave the repairs to the people?—Yes.

88. Q. Are you aware of the orders of Government which direct that whenever a man, owing to the disrepar-

of his tank, finds that he cannot gel water on his tand and applies for remission of water-rate the application should be considered?—It has been passed since my retirement.

[Mr. Ibbetson.—He has to apply for a remission? 4 Dec. 01.

Mr. Muir Mackenzie.—Yes; the orders of Government were that the water-rate should not be remlitted unless some body asked for remission.

Mr. Rajaraina Mair.—Is it permaaent remission or is it granted each year?

Mr. Muir-Maclenzie.—If the tank is in disrepair a man does not get water then it is permanent

Mr. Ibbetson.-Next year if you repair the tank

Mr. Muir-Macken-ie,—That case has not been considered. If people apply for remission the matter will be investigated.

WITNESS No. 18 .- Mr. GARESH GOPAL PANDIT, Landowner.

Answers to printed questions.

#### A .- General.

My an wers refer principally to a portion of the Daskroj. Sanand and Parautij Tolukas in the Ahmadebad District. But I have travelled n good deal and hove observed the agricultural statu of things wherever I have travelled, and so my answer, may refer to other localities also. I am ucultivator in the first two talukas, have set up steam pumps at Futchwadi and Bakrol au the Sanand Taluka for irrigating my lauds in these two villages. I have a friend in the Parautij Taluka; through him I have hecome acquainted with that tsinks also. ted with that tainls also.

- 2. I have no figures by me by which the rainfall averages can be calculated. But the general rainfall is from about the ead of June to the end of August. There is hordly any from January to June. But of late years it is very irregular, inenficient and fitful.
- B. (1) In my opinion there is no obstacle arising from sparsity of population, but enterprising and wealthy cultivators, who as such no very few, are wanted.
- (2) The supply of cattle la generally insofficient owing to want of sufficient free pusture laud nod growth of fodder crops, which require to be encouraged by remussion of a sessmenta on lands on which plenty of fodder crops are grown. I occase of cattle by judicious breeding and abundant supply of dry and green fodder will be very beneficial to dry as well as wet cultivation. The families affects and destrops cattle more tima msn.
- affects and destroys cattle more tima men.

  (3) The supply of manure is insufficient and most of the stuff is not properly utilized. The principle that soil clay is the Cat disinfectant and storer of ammonia on necount of formation of eyele of double silicates of alumina and soda, alumina and hune, alumina and potash and alamina and numenon is not understood. The ness of salt is prohibited by the heavy excise doty over the most essential ingredient of food of man and cattle and a very useful article of manure for land. Booes and boso meal are experted and not utilized in manuring Indian soil. Instead of talari being given for manoring land, if manure is provided at a very low cost to cultivators, it would be mach better. The State may undertake the production of salino manures, for in that case the Excise Department of Government would bring no hindrance in the way. All agriculmannes, for in that case the Excise Department of Government would bring no bladtance in the way. All agricultural improvements consist in the production and utilization of useful manness are not manting in India. But there is want of enterprise and it is the duty of the sympathetic Government to erecurance enterprise wherever it finds it, if it enterprise itself show the way. Irrigated land requires more manure, as much of it is washed by the lower strata, and nearly is utilized in building up the ercp. Production of manure and use of it on a large sale will make irrigation more refit dile than at present. more profitable than at present.
- (4) In my spinion no soil is unsuited for irrigation in 18 in my spinen no source answer for irrigation in fraint witers surface evaporation caused by exceeding forther for drainings, nuderground as well as sorface. Irrigated black and will improve under underground distance. I should think.
- (5) Uncertainty of irrigation water-supply will be a great landers see to valuable wet crops, as the money and labour fold out in them will be wasted. In dry oner even the control of the and risin any ply will be a great help, when the rainfall is fitful and insufficient.
- (6) Lack of ea; ital for the initial expenditure and of for is for the more experience cultivation of irrigated on peater and the great obstances to the extension of irrigation. It is very deficult now for educated and enterprising culti-

valors to horrow moacy from capitalists, for owing to the so-called "Amendment" in the Revenue Code all right over the land except that of cultivation is taken away from the cultivator. He cannot sell or mortgage any portion of it. Copitalists will not therefore advance money to cultivalors for necessary improvements. It hecomes therefore the duty of Government to help the holpical but cuterprising and educated cultivator in his works of irrigotico.

Mr. G. G.

- (7) Fear of rent being enhanced or revenue assersment increased will no doubt act as an obstacle to the extension of irrigation. Fixed settlement will remove this difficulty.
- (8) Uncertainty of tenure or defects of the Tenancy Law throws great obstacles in irrigation being extended.
- (9) Pororly, general igoorance, want of even redimentary education, the general apathy on the part of Government officials that come in contact constantly with the agricultual population, etc., may be mentioned as other reasons that directly or indirectly serve as obstacles to the extension of irrigation.
- 4. Lands irrigated from works constructed by private capital nie, as far as I know, exempted from enhancement of assessment, during the tenure of the Surrry Sottlement, in which the irrigation work is constructed.
- 5. Loans under the Lind Improvement Act are not freely taken by the people for various reasons; some of them may be mentioned as follows:—
  - (a) Machinery of Government for granting these loans is too intricate.
  - (b) Villago officers through whom these loans pro settled are generally corrupt.
  - (c) Loans when granted are too late, i.e., not timely.
  - (d) A portion of the loan given does not reach the cultivator.
  - (e) Sympathetic expert udvice from a Government who is empowered to grant loans and who is a man of good character of established merit, will go a great way in slopping all sorts of corruption, and encourage entitivators to make irrigation improvements on their lands.

I would recommend the measures suggested in questions I to 6 according to circumstances to be considered by a body of village Pacebaynt presided over by the Mamlatdar or bis Aval Kurkun of the taluka in which the land lies.

- 6. No. Irrigation would attract those only who are enterprising as well as those who have not got sofficient means to carry on their ognicultural husiness in their own localities. Exceptionally bad years would drive nway people from healities where there is no water, or very facts.
- Yes. I have people from the Dhangadin State come to my irrigated lands to cultivate. People of Patchwadi and I akrel would be glad to take my primped water if I would give them in their lands. But Government has restricted me to certain sarrey numbers only to which I can give water without having to pay any additional water-rate.
- 7. Irrigation would increase the value of the produce of lacd.

double by (1)

three or fourfold by (2).

It will remain stationary under (3) (0); in (5) (5) will be no good as in (3) (0); in (3) (c) at will be tair other.

Mr. G. G. Pandit. 4 Dec. 01.

- 8. My estimate of the increase in the total annual value of the produce per acre due to irrigation would be nearly double on the average of a normal term of years, and 3-2 in a year of drought.
- g. In the Daskroi Talnka we pay Rs. 7 per acre for monsoon waterings, when rain is not sufficient or timely for ricecultivation. The supply is given from the storage made in the Chaudola Tauk from the Khari Cnt. In the Parantij Talna, they pay Rs. 3 per acre, under the same circumstances. These rates are paid on the area of the land actually irrigated.
- which has been continually irrigated during monsoon, and which lies in the immediate vicinity of the Chandela Tank storage on a low level. Such lands, I think, can be improved by deep ploughing and proper mannring, by drains all round the field, if possible, by growing such crops as would take up the too much moisture and the salts accumulated on the land. I have seen some of the lands of Danu Limda near Ahmadahad spoilt in this way. I suppose the irrigation of the Danu Limda rice land is more than 100 years old. When the supply of rain water is plentiful, rice plantation thrives well, but when it is insufficient, the evil is increased. My experience of draining irrigated lands is that they romain free from the above ovil.
  - 12. Wooden plank dams or masonry dams are thrown

- across the Khari at Rayapar and water is thus raised in the river towards the source. This higher lovel of water in the river can irrigate all the low-lying lands in the vicinity of the river. In some cases storage tanks, which lie bolow the lovel of the rivor bed, but higher than the land to be irrigated, are stored with water and the low-lying land is irrigated then by means of canals. In a year of ample rainfall good supply is maintained for four or five months. In a year of scanty rainfall, the supply is hardly kept at a workable level even for a few days after the cessation of rainfall. In a year of drought there is hardly any water in the storage tank.
- 13. I would give the same answer to this question as I have given to question 7.
- 14. If the irrigation is commenced too late or casses too early in a given year of sourcity of minfall, its value is altogether destroyed.
- 15. Irrigation in a few cases is supplemented by irrigation from wells given to the same land. It is essential to those irrigation works which depend for their supply on small rivers, which depend for their supply of water on rainfall or on eterage tanks enpplied or fed by these small rivers.
- 16. I would answer this question as I have attempted to do question 8.
- 1. Q. (The President.)—You are a land-owner, I understand, in this district?—Yes.
- 2. Q. You irrigate your land with steam pumps ?-Yes; I have two pumps in use on my land.
- 3. Q. Are thoy on the river?—Yes; one is on the river and the other is on a well in the river-bed.
- 4. Q. What is about the height, which you have to lift the water P—Tho one at Fatohwadi 23 feet, and the other at Bakrol 27 feet.
  - 5. Q. What pumps are they?-Wynno's centrifagal.
- 6. Q. What is the diameter?—One is 10 inches and the other  $7\frac{1}{2}$  inches.
- 7. Q. Have you used them for many years now?—I have used them for two years.
- 8. Q. How much finel do you burn?—If the engine is in proper order, I hurn 50 to 60 mannds in the 10-inch pump is 10 hours, and 30 to 40 mannds in the other.
- 9. Q. Are you satisfied with the experiments ?—Yes; I would recommend other people to do the same thing. The channels should be pakka, as the quantity of water lost is great; and the carthen channels give way; I asked Government for help to make them pakka, but they would not do so.
- 10. Q. How many acres do you irrigate?—In the famine year, I irrigated 200 acres with the higger pump.
- 11. Q. What are the crops grown?—Mostly fodderorops: juari last year; and this year I have sown wheat.
  - 12. Q. They are not used for rice ?-No.
- 13. Q. Do you find that this distinctly pays yon?—It does not pay me yet, because I have not got proper channels: these give a great deal of trouble. I have to stop the pump now and then, to repair the channel.
- 14. Q. Are the channels above ground?—In the village of Fatchwadi, I have 1,200 feet of under-ground channels, a there was back pressure, and the under-ground channels sometimes burst. I also had high earthen channels, but these too gave way. I have now lowered the channels. My land is level, and there is now less trouble than before. Properly speaking, I have not had sufficient opportunity of testing the profitableness of the concern.
  - 15. Q. Have you used cotton stalks for fuel: they uso them largely in Egypt ?—Yos, I have.
- 16. Q. I suppose you can hardly tell what your expenses are per acre?—No.
- 17. Q. Do other people come to you and ask for the use of your pumps P—They ask for water; but I am not permitted to give it to any land except certain specified land. If I give water to other people, whose names are not included in the Government list, a water-rate is charged.
- 18. Q. Does that fact prevent them coming?-Yes, it does.
  - 19. Q. It makes it too expensive for them?—Yes.

- 20. Q. What is the water-rate P—Rs. 1 per acre. I am not charged for my specified land.
- 21. Q. (Mr.: Muir-Mackensie)—You have taken up waste lands ?—They were all oulturable lands.
- 22. Q. They were unoconpied P—Some I purchased from occupants; some I took from Government.
- 23. Q. (The President.)—Do you feel anxious this season about the lowness of water in the Sabarmati P—I think we can get water all from wells in the bed.
- 24. Q. Is there any idea of forming a Company to get more pumps?—If they see that my enterprise is successful, people might come forward.
- 25. Q. How much will your pump irrigate?—The 10-inch pump will irrigate 300 acres.
- 26. Q. (Mr. Muir-Mackenzie.)—Would it irrigate more than 300 acres?—If the channels held more water, I could irrigate more.
- 27. Q. (The President.)—Is your land close to the river?—Yes; there is only a village between.
- 28. Q. Did you import the pumps from England ?—No; I purchased them second-hand.
  - 29. Q. Are they satisfactory?-Yes.
- 80. Q. Does one Engineer look after both ?—Yes; I don't work them together.
  - 31. Q. How far agart are they?—Two miles.
- 32. Q. Yon say in your memorandum "the use of salt is probabited by the heavy excise daty over the most essential ingredient of food," it is the duty that has stopped that?—Yes, with excise we get 27 ponuds por rupee; I don't know how much is expise charge.
- 33. Q. You say ogain "bones and bone-meal are not utilized in manuring Indian soil"?—Yes; I suppose agriculturists do not understand their use. Government ought to make some provision for teaching agriculturists their use.
- 34. Q. There are Government farms and an Agricultural Department P-1 don't know of any here.
- 35. Q. Do you believe that, if salt was cheaper, it would be utilized ?—Yes; some of the cultivators understand its use; others will have to be told; and they will soon learn the benefits of manuring.
- 86. Q. Yon say in your memorandum "surface evaporation caused by excessive solar heat serves for drainage under ground as well as surface." Can you tell ns any facts about irrigation on black soil?—I have some soil in Fatehwadi, which does not deteriorate by irrigation: our solar heat is so great that a good deal of water is evaporated.
- 37. Q. Do you think any good has been done by inigating black soil: would it be the same without irrigation?—
- 38. Q. Many witnesses have said that black soil can get on without irrigation, except in exceptional reasons, and that it is waste of water to irrigate it?— That is not my experience.

- 33. Q. You say, in prescraph 5 of your memorandum, that there are many obstacles in the way of obtaining louns. Can you suggest any hop presentat?—At present application has to go through too village officers, and they have the equived by fair means or by fool, and then only will they forward the applications. It takes a long time. It took forward the applications. It takes a long time. It took more than a year before I got a reply, and that was in tha zerative.
  - 40 Q Was it n rep'y about takavi ?- Yes.
- 41. Q. What should be done?—A cultivator know if he is to get an advance as soon as possible.
- 42 Q. You say village officers are generally corrept?— Yer; especially the lower officers: big officials don't take the trouble to go into matters, and petty officials manage everything.
- 43. Q. What would you do to make the province better able to resist famine?—I should say that the rain water, which is now wasted, should be utilized by being stored in tanks, and more irrigation tanks should, if possible,
- 41. Q. (Mr. Higham.)—Where do your pomps lift water out?—One direct from the Salarmati river and the other from ? from a well.
- 45. Q How much do they deliver?—If they work at full speed, one delivers 18 likhs of gallous in 12 hoars, and the other about 8 likhs; but I cannot work thom at follspeed owing to the channels.
- 49. Q. What is the amount they irrigate?—On the bigger pump 300 acres and on the smaller one 50.
- 47. Q. Is it cheaper than raising by bullocks f-Yes.
- 45. Q. Are you quito satisfied ?—Yes; but I shall be more satisfied when all the arrangements are complete.
- 49. Q You carry some of the water through pipes ?-I have made an under-ground gutter.
- 50. Q. What is the matter with the channels?—There are holes in them through which I luse water. A good dowl of damage is also done to the land, and the chonnels give WAY.
- 61. Q. Da you poddle your chonnels?—I have used a little clay, but it does not hold woll.
- 62. Q Whot charge do you make to others for the supply of wat: ?—In n famine year I charged very little—Re. 1 per light which is a acre. Lately some people from Kathawar have come, and settled on my land. They find the seed, and I give them water and land, and we divide the produce equally.
- 53. Q. Hes any body else got pumps f.—There is another man who has had a pump for one aud-a-half years. There were come pumps in Khairs, but the river water has run down, and so the pumps are not working.
  - 54. Q You say in your answer to question No.9 " in the Dasknoi Taluka we pay Rs 7 per nero for monsoon water-lines, in the Parantij Taluka they pay Rs. 3 per nero, an let the same circumstances." Why is there this difference?—I don't know.
  - 55. Q (Mr. Ribetson.) -- How much land do you own?-- About 1.1(A) acres.
  - 66 Q. Is your occupation merely that of land-owner?-
  - 57. Q. Yoo say you have been irrigating black cotton soil with pumps !-Yes.
    - 58. Q. What crops do you irrigate ?-Juari and wheat,
  - 59. Q. Juari is grown in the monson ?-Yes, and also in the hot weather. I did not irrigate this year in the monto in, but I did in the famine year.
  - CO. Q. Do you think that the juari and wheat that you irrheated took more water owing to the black cotton soil than a would have in other soils i-No.
  - 61. Q. We have been told that a great deal of water runs to waste in black cotton sail; that is 10! your experience is to the contrary, i.e., that it requires here water. It can bold water for some those.
  - 62 Q After you have given water, if there has been no rain, does it require watering agon ?-Yes.
  - 61. Q. Do you mitture the whole of the orrayon irrigate b- Thy a dias a good deal of manure at present.

  - Ci Q Wist cr. p would that he good for f-Any crop.
  - cd. Q. U. any sell?-Yes.

- 67. Q. You say in paragraph 7, "the fear of rent Mr. G G. being enhanced or revenue necessment incressed, will no doubt act as an obstacle to the extension of irrigation." I thought that, in Bombay, the assessment was not 4 Dec. Ct. increased on secount of private improvements ?- I cannot
- 68. Q. You know the law is that it should not be increased !-It is a fact that it was increased.
  - 69. Q. You don't know why it was increased?-No.
- 70. Q. Nothing but a permanent settlement would re-more your doobts ?-No.
- Q. You say at Patchwadi and Bikrol, people would be glad to take water, if they did not have to pur the water-zate, what do they pay?-Half the produce, minus half the
- 72. Q. That would be more than you are getting from your own tenants P-I have not thought about it.
- 73. Q. (Mr. Rajaratna Mdlr.)—What extent of land was given to you free of assessment for irrigation by yone pumps?—I applied to Government to take water free of charge, and Government replied that I coold irrigate free of charge the land I then occupied.
- 74. Q. What was the area of that land ?-Neirly 1,000
- 75. Q. You can imigate the whole of that without paying anything beyond the dry assessment !- Yes.
  - 76. Q Do the orders of Government prevent you from selling your water to other ray at f—It is not the order of Government, but I know this by experience; ootside my specified area, there is a field which I irrigated, and because I irrigated it, they charged mo Re. 3-8 for the use of the water. I contended that it was necessary for me to have my channels through that field, but they would not remit the water. the water-cess.
- 77. Q Is there any injustice in Government chi a water-rate for selling your water to other people?—The injustice is this. People are allowed to take river water free of cherge, and if I give the water at my expecse, Government charges me for that,
- 78. Q. You are not making a free gift of it?—I was toking the same rate as I charge on my land.
- 70 Q Is it not fair, then, that you should pay a share to Government? What is the ordinary charge? -119. 1 per neie.
- 80. Q. What will the rayat pay you for the water P— He would pay no one-third portion of his gross proloce any day; I will charge in fature half the produce sainus half the assessment.
- 81. Q. What does that represent in each ?-About Rs. 40 to Rs. 45 per acre, gross value
- 82. Q And you gradge paying Ro. 1 to Covernment. The orders of Covernment do not procont you from extending your improvements?—No.
- 83. Q. You say in paragraph 6, "it is very difficult now for educated and enterprising cultivators to borrow money from capitalists, for owing to the so-called 'nmendment' in the Revenue Code, all right over the land, except that af calitivation, is taken away from the entireator, he cannot sell or mortrage any portion of it. Capitalists will not therefore advance money to entireators for necessary improvements." Have you any facts to support this statement?— That is the Act.
- 81 Q. How long has that been in operation?—I don't know; but I know that a somear would not lend me Rs. 5,000 on mortgage because of the new law.
- 85. Q. You can borrow from Government ?-I oskol Government for Rs. 10,000 and Government would not give
- 86 Q. What was the reason ?-Probably the reports of the District Officer.
- 87. Q. If it was for land improvement, Government would not refus. Did you require it for other purposes 9-1 wanted Rs. 10,600 for improvements.
- 88. Mr. Meir-Maclenzie.-Money had to be given to poorer people; that is my surmise.
- 89 Q (Me. Rajoraina Mdle.) You don't leud moves pousself :- No.
- 92. Q. It was said by some witnesses that Lanius will not advance in very for wells, is that the case ?—I cannot say now, under the new Act: they need to attack it.
- 21. Q. Wi ther obvarce it freely before !- Yes, to these ray's with whom they had desings.

Mr. G. G. Pandit. 4 · Dec. 01.-

- 92. Q. Would they give Rs. 1,000 or Rs. 500 for a well at a time?—No, not so much, if the cultivator was not a well-to-do man.
- 93. Q. Was this Rs 10,000 that you asked for for your channels P—Yes, and for cattle.
- 94. Q. You reckon that your cost comes to eight annas per acro per watering?—Yes, when all the arrangements are complete.
- 95. Q. How many waterings will you give for wheat? -Fivo or six.
- 96. Q. How many waterings for juari ?- Four or five.
- 97. Q. In an ordinary year, would you wantso many waterings P-Not in the rainy season': wheat would want gonerally about four waterings.
- 98. Q. In what month do you give the first watering? -In October and November.
- 99. Q. In an ordinary year, the land would be well saturated by that time P—Yes, and it would be ploughed.
- 100. Q. In an ordinary year, when would you give the first watering ?-If I had commenced sowing wheat, and if there was no meisture I should have to give it at once. In an ordinary year I should give it in November.

- 101. Q. This soil is mostly black soil?-Some is black some alluvial and some sandy, but most of it is black.
- 102. Q. The same as in Breach ?-Not exactly the same ; there is a good deal of sand in it.
- 103. Q. What sert of crops would it yield without irrigation !- It will give a cotton crop.
- 104. Q. Does black cotton soil crack much in the hot westher !-- Yes, it does.
- 105. Q. How doep is it ?-Fivo or six fest with kunkur below.
- 106. Q. Havo you had any experience of irrigating atten ?—No: I have a small area on which I have irrigated cetton Pcotton, but the rats out it and I have not completed my expailment.
- 107. Q. Was it owing to the talatis' obstruction that it took a year for you to get a reply to your application for a loan ?—I cannot say.
- 108. Q. Do the village officers give you much trouble ?— They don't give me trouble, but they do not attend to my wants.
- 109. Q. You did not anbuilt your application through the village officers?—It went to the Gollector, but it has to go to the village officers for report.

## Witness No. 19.-Mr. Pestokii Menadhai Khengamwalla.

Mr. Pes tonji. 6 Feb. 02.

- 1. Q. (The President.)—You are part-owner of a steam pump ?—Yes.
- 2. Q. What is the size of the pump?—There are two pumps: one is a 12-inch one, and the other 15 inches.
- 3. Q What is the horse-power ?-12 and 15 respectively.
- 4. Q. Are they set up on the banks of the Sabarmati ?-Yos.
- 5. Q. Have you any land of your own in that place, or do you merely sell water f-I sell water to the cultivators, but receive part of the produce in payment, not cash.
- 6. Q. How much ?—One-fourth of the rice crop and one-third of the wheat and sugar-cane.
- 7. Q. (Mr. Higham.)—Is that for water only ?—Yes, the land is not mine.
- 8. Q. (The President.)—Has the cultivator to pay a water rate to Government as well?—There is no water rate on the land, Government have given mothe right to use river water free up to 500 acres; if I give water to over 500 acres. I have to pay, but the terms have not yet been settled by Government.
- 9. Q. How much do you irrigate now?—This year I have irrigated 300 acres; the pamps could irrigate 1.500 to 2,000 acres; they are not able to irrigate a larger area, because the channels give way under the pressure of water ; besides this, some damage is done by rate.
- 10 Q. Are you one of the partners of a company ?-Yes, there are two or three partners.
- 11. Q. Is there a ready demand for the water?—Yes, there is a great demand for it. This year there has been a complete less owing to the destruction caused by rate and locusts.
- 12. Q. Arcyou oncoaraged to go on P—Yes, we have made an application to Government for aid; we have asked Government for a lease of land in order to grow babul trees for fuel for the engines. If this is granted, our speculation might become a profitable ouncern.

- 13. Q. In that case, do you ocatemplate extending year cerations and buying more pumps?—We will extend our operations and buying more pumps?—We will work by putting up pumps at 2 or 3 other places.
- 14 Q. I sappose you could put them up at a dozen other places if it is prolitable?—Yes, one of my pirtners, Mr. Smikadum Escolbhoy, is a big importer of machinery in Bombay. At present the people are willing to put their lands under sugar-esne, but the solvears have no names to adverse. monor to advance.
- 15. Q. If takavi was available immediately, would they put a large area under sugar cane?—Yes, they want the monoy for seed.
- 16. Q. Do you consider that the rates are sufficient to make it a profitable business?—Yes, if I continue these rates, it will pay in the future. If I convert the produce into cash, it will come to about Rs. 6 to Rs. 6 por bigha, which will be equal to about Rs. 10 or 12 per agree.
- 17. Q. What is the lift of your pumps !- Thirty feet (centrifugal.)
- 18. Q. Isuppose the engines are pertable?—No, they are horizontal fixed eaglnes.
- 10. Q. (Alr. Higham.)—How many oultivators do you supply with water P—Two or three villages.
- 20 Q. How is the distribation managed !- A roster is fixed and the cultivators get it in turn.
- 21. Q. During his turn is a oultivator allowed to take as much as ho likes ? —Yes.
- 22. Q. I suppose the number of days a cultivator has to wait will vary with the orop ?—Yes, wheat takes 4 waterings; rice took 4 this year; sugar-cane requires 50 to 58 waterings, and is irrigated overy four days.
- 23. Q. That is not during the rains ?-No, but if the rein stops for a moath it requires water.
- 24. Q. (Mr. Muir-Mackenzie) Is cotton grown ?-No.
- 25. Q. Are there any difficulties in getting applications sanctioned ! - No.
- 26. Q. Have caltivators any difficulty in getting manure; -No : the soil is very rich.

## SEVENTEENTH DAY.

Ahmadabad, 5th December 1901.

WITNESS No. 20.—The Honourable Mr. F. S. P. LELY, C.S.I., I.C.S., Commissioner, N. D.

Note by witness.

The Province of Gajarat has for the most part been formed by allavion, a process which is still going oa. An arm of the sea which once separated it Mr. Lely.

from Kathiawar and is now represented by the Ran of Cutch and the chain of Isgoons known as the "Nal" has been filled up within comparatively recent times. The effect has been to silt up the lower courses of the rivers

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of that region so completely that Instead of reaching the reachey provide out ever the country forming water-legged trasts with the ne cal accompiniment of saline efforcement. Such his been the fate of the Rimas which once empticilisely into the Ran of Cutch, of the Ularli, the Nilki, the Ilbadar, the Roth river in Sanaod taloka and others of small size. The same process is, if I am not insighten, going on all down to cross of Gujarat as far as the Toptic eggins the drainage of the conoty. The whole Gulf of Cunbay is being filled up with sheals, leaving only in manow and devious water-may, as may be seen on any clart. The Mitar taluka, once thoroughly drained by the Wariah nod the Maximati, is now so obviously determine the Wariah nod the Maximati, is now to obviously determine that Government have had to make one reduction in the a seament and will soon have to make another. The town of Combay, once upon the bank of the Mithi, is now moved from it by several miles of allavial bank. There are water-legged areas in through districts north and senth of the Kanbada and in the Olpad taluka of Smal. At the same time the popular voice is unnaimous that to the rices that comound these areas the volume of water Is much less and the leads higher than they were within the memory of living men.

- 2. If the above impression is correct, it errms likely that the successive rivers from north to south, beginning with the Bhogawa and Sibarmati, will silt themselves up and stagnate over the country, or find themselves other courses. In my chinico the sobject should be thoroughly examined and reported on by an expert Engineer, so that treadly-concined measures may be taken to prevent the deterioration that has begun.
- 3. Irrigation by Canal.—This is not everywhere possible and where possible it is not early and where possible. In the southern half of Surat district it is not needed, because, with a heavy and generally constant rainfall and a retentive soil, a second crop (legaminous) is grown after rice without any nruficial watering. North of the Tapit the soil becomes black and is devoted to cotton, when is not picked until the cold weather is over. It is said that watering makes it run to word and leaves, but however that may be, the extra cost nould not be recouped at present prices. Nor is there anything to take its place. The people would certainly not take canal water in the black soil country between the Tapii and Mahi ricers, or in the weat of the Ahmedabad district. It would also be superfluous in laud an retentire of moisture. In the sandy so I of Parantij taluka again, the Hathmati Canni has been a failare, because among other reasons the loss in the channel by percolation is coormous and because the rice beds will not held water without great wastage.

  4. The only tracts where a canal supply would be we'comed
- 4. The only tracts where a canal supply would be we'comed by the prople are adapted for rice being, the sand being mixed more or less with loam. In many villages on the Khari system the soil is so light that it would almost never support of fee crop to the end without the artificial supply. Even in other more relentive soils the latter rain fails in two or three years out of tre, but if water could be guaranteed through the cold weather, a second crop of higher or wheat could be secured (provided there was manure), whether the rice needed watering or not. The value of a canal reaches its climax in those villages where the soils are self-
- 5. Although annal inigation is not us a rule suited to flujant. I should not oppose extram well considered schemes. Objections are: (1) the great difficulty of scening supply which may be depended on in years of scening supply which may be depended on in years of scening ramply which may be depended on in years of scening ramply which may be depended on in years of the Ilathout and the Tapti carals, on engineering tables then on egricultural considerations; (3) the temperation to the entiraless when water is brought to them without effort to occasion their land and to overflood it. On all these points and an others, wells have the nelvantage. On the other hand there are tracts where though the land is good and tho enlivators intelligent, may of the wells are brackish. In those tracts a canal scheme might be considered if otherwise feasible, if a supply can be assured and if the soil is sailed to nee cultivation which is and will long be the chief crop in Gujarat to need irrigation.
- O It is for the size crop alone that the system of irriirright where gotton lanks in Gujarat came into gation lanks in Gujarat came into from Native rule. Their recessly is basedeen the fact that in polished years cut of 5 the yearly rainfall sofices for string, transplanting and bringing the plants forward,

lest fails at the lest when water is needed to mature them. They are sometimes nothing but basins in the corners of folds which conserve the early rain to be paid out some weeks later. They then run dry, whether large or small, for they are not dag deep. Their led should be higher than the surrounding country to allow the water to tun on to the fields by gravitation. It follows as of course that they are if no use for watering ruli crops, though they are often the means of saving a most valuable outtorn of rice. It may be mentioned here that the "Kannod" rice grown in Northern Gujant commands the top piles in the market, being the only sort the wealthy claves will cat. Successive good crops would probably pay the cultivator butter than sagar-cane.

- 7. The particulars of these irrigation tanks will be before the Commission, as also the declinations of the highest authorities that Government is bound in honesty to keep them in repair to return for the special water-rate which forms part of the assessment. They have not been repaired as they should be, for research the Public Works Department will explain. I have only to suggest that the preference given to people who contribute 10 per cent. of the cost should be abrogated. This would leave the Public Works Department coursely free to take up systematically groups of tanks year by year, which would tend to economy and thoroughness.

  8. It has not been the martice to give remissions of
- namy and thoroughness.

  S. It has not been the practice to give remissions of land revenue when these works fail. They should be given with reference to the water as distinguished from the soil. For if the crop fails, the whole fails and a semission of the water-rate only, retaining the soil rate, will not meet the cass. The division between the twa heads is under in the nurvey records but differently in every district, and there would be room for difference of opinion as to the correctness of the adjustment. I am myself of opinion that as a rule enough is not credited to water.

  9. The remain and construction of such works, if not
- 9. The repair and construction of such works, if not undertaken by a private landholder, concern the Imperial land receive only, and me nitogether outside the sphere of District Boards. When expenditure is incurred by the Public Works Department on an irrigation tank which is also a village tank used by the people for drinking, bathing, or watering eatth, etc., it is the practice in this dission to get a contribution from the District Board. If private landholders wished to undertake work of this kind on their own land, they could readily obtain takayl for it, but they never do.
- 10. I do not agree that a good deep rillage tank such as was dug in large numbers in recent famine time is useless even ulthough not used at all for dieset irrigation. In olden times it was one of the first benefactions that occurred to the man of means who wished to spend his money for the public good. A sheet of fresh water which holds out through the year is a centro of health and sweetness. It humidates the atmesphere. It is a means of cleanliness to man and beast. Above all it permeates to all the wells within its influence and corrects their brackishness if it exists. Remorkable instances of this could be adduced. On the whole, I am of opinion that in nrid, saltish tracts there is no more beneficial form of famino laboar possible than stuking a well-planced tank for storing rain water.
- 11. Similar to these are ender pounds in rivers where owing to rocky beds they can be made without great expense. In the river Wanki, south of Bulsar [Samt district), the B., B. and C. I. Railway Company made some years ago a masonry band with a sluice in order to provide a supply for their station near at band. The result is n permanent store of water which is a delight to the eye. By saturating the adjacent country and also by means of dekedis it has clonged a limited area into a perennial gardea. Many such londs and sluices would be possible in the small rocky rivers of that part of Sneat district, and also I should think in the appear courses of the Mahi and office rivers. They would probably not be remanerative to Government at first for sweet reasons, but they ought not to cost runch on well scheed sites, and they would conserve in the most lenshial form masses of water which now run off when. The people would slowly learn to take full advantage of them.
- 12. A inchern form of enterprise is the erection of the first parties are irrigational steam gamps on the Saharmati and one on the Watrak, and there may be others. The mater is generally supplied to the collivators

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in return for a half shore of net crop. These undertakings should be encouraged by Government by imposing reasonable and uniform aenditions, and the possibility of their great extension should be borne in mind when framing such schemes as the Sabarmati canal.

18. First, however, in the list of irrigational methods in Wells. Gujarat must be placed wells constructed by the people themselves. The fact that a cultivator is willing to take the risk and trouble of making the well and of drawing the wator is a security that he has the means to make it a success,—the knowledge, the enargy, the appliances and the monnre! The canal and the gravitation tank mode by Government guarantea none of these things. In restricting both the number of walls and the amount of water daily sapplied to the land the co-operation of the cultivators acts as an automotic check on over-irrigation which does not exist when water is brought witbout cansulting them and laid on their fields without any effort on their part. Consequently when sub-soil water is sweet, plentiful and at a workable distance from the surface, nothing more is advisable than to encourage the cultivators by easy guants of tukavi to dig wells. Unfortunately these aonditions are often absent.

14. I think the interest on works of improvement os distrakavi—Interest. tinct from mare "agricultural loans" should be reduced to 3 per cont., i.e., 4 annas per month. Whatever may be the cose in some other parts of India, it is certain that in most of Gnjarat in ordinary times the Soncar will lend for a sound improvement, such as a well, at 8 names per month, i.e., six per cent. per annum plus n small commission on "opeaing his bag." On loans for seed, buying cattla, subsistence of the cultivator, eta, he will of course demand more, and there is not the slightest reason why Government should not do so also and keep to their present rate.

15. I do not think the method of distributing takavi for Takavi-Promputude in distribution.

Takavi-Promputude in distribution.

Takavi-Promputude in distribution.

For koeheho wells and for seed, etc., do not come within the scope of this discussion and should not, in my opinion, he given ut all by Government except (1) in time of famine, or (2) to lackward races whom it is desired to free from serf-dom to the sovkar. It may be well that the officer distributing for these purposes should be able to carry money with him on tour and pay it out without any circumlocution. But in this Division the practice for larger loans is for the applicant to present himself once hefure the Mamlatdar to ask for the money suid again after the report by the "Villago Panchayat" to receive it. These visits to the Taluka Head-quarters are not regarded by the people us in nny sensen hardship and are of positive advontage as marking the gravity of the transaction. A man who really means to make a well will give himself much more trouble than that to interview the brick-maker or the mason, or, when

Takevi-Strictness of recovery.

Takevi-Strictness of recovery.

Takevi-Strictness of recovery.

Takevi-Strictness of recovery.

To genrly paymonts which he knows will be enforced with ragularity, even, for all he knows will be enforced with lands. It is not merely the chance of a bad year for be may hope for lenience on account of that. If a death or marriage takes place in his house and sweeps off all bis ready money the savkar will make allownooe, but not so Government. Hence he hasitates. On more than one coasion I have lately been teld by villagers that before taking large sums to build walls they intend waiting to sea how it fares with those who borrowed from Government during the famine. The difficulty is not an easy one to meet, for of acuse o loan for a ramunerative work must be recovered on business-like terms, and any ottempt through the village officers to take account, as a savkar does, of a man's private circumstanaes would only result in unbridled corruption. A general concession, I would suggest, is the recovery by easier instalments than have hitherto been usual. The life of a well being from 50 to 100 years or more, there is no reason why repayment should not be spread over 20 years or more. This would not be felt by a vigorous man. The smallness and the definiteness of the demande combined with freedom from dunning between-times would be realized by all as great advontages.

Takavi—Risk of total loss.

Takavi—Risk of total loss.

Man iu Sahijpur (Dholka toluko) who hy all oocounts

spent and lost Rs. 500 in this way last year. He had called in a Brabmin "Joshi" of local repute who profe-sod to find water with wand and incantations, but only succeeded in finding salt water. This merning I saw a well (in the Kaira district) which had first of all been dag and steyned to the depth of 20 enbits, giving swest water. The supply ran short and digging was continued with the usual wooden ring, 10 anhits at a time, until a ploutiful spring was reached at about 50 cubits from surface of ground. This was good to the taste, but after a year's trial turned out to he "chopdu", that is, its effect was to hind the soil together like glue and evanually stop all growth. The result is that the well on which nearly Rs. 1,000 has been spent lies unased and useless. The nafortunate owner told me with tears in his eyes that he had berrowed all the money in 1954 (A.D. 1897-98) from a sayker at 6 per cent. and had nothing to show for his enterprize but tha dobt. Many wells, especially in favoared tracts, give a sweet and full supply at 20 or 40 feet from surface. Some give none at all within a reasonable depth. Some are salt from the beginning. Some are sufficiently sweet for one watering hat not for more, and these are of some use for rice aultivation. Some are goed for eac season and then must ha anused for two or three. Some mest disappointing of all are sweet for a year or two and then gradeally turn salt.

18. The question is, can tha people be ossisted to meet these froaks of fortune? The use of bering tools (Shaeda) good down to 30 feet or so, is known to the people in many parts, and two or three are being placed at Government expense this year in various tslukas for fres loan. I am not, however, sauguine of much result. Either they will not find favour for want of expert direction, or being roughly and earelessly used they will soon get broken. Privata blacksmiths have already begun to supply them on daily hira, and in ordinary times it would seem better not to interfere in the business. The use of these shallow-boring tools will not however always or often prevent los, for permanent sweet-water is not often struck within 30 feet, and in most soils the steyning has to be put in boford that depth is reached. I notice below the suggestion that deeper boring nader trained men should be carried on in tracts where the upper water-beering strata are salt and it might be arranged that these parties may bore in the lond of any holder who is willing to pay the whole or, say, the half of their expenses, or, better still, a fixed fee. Cases in which the water is not salt but "chopdu" are much more rare. At present the cultivotor has to wait for a round of seasons before be can detect the fault. The Agricultural Department should have ot its service a laboratory where all snoh points can be settled at once for a small fee. Few of the people would resort to it at first, for they would have httle trust in its vordict. The sooner a beginning is made the sooner snoh agencies will justify themselves. With the spread of education leaflets to inform the cultivator whot is heing done and what is possible to him would be useful. Ultimately he would only have to get a boring made, deep or shallow, as may be incicated by the general water level of the country and gat a smuple tested hoth for merits and defects, though even then he would have to take the risk of the water subsequently turning salt.

19 It has been suggested that remission of takavi should Takavi—Romission to case be given in every case of failure.

There is much to be said for this proposal hut also many objections. It would lead to many and varied attampts at fraud which could only be guarded against by therough enquiries which the already everburdaned staff have little time to moke. The Collector might be given power to make remissions in hard cases, but this half and half solution would also be objectionable. A definite promise on which a claim can be based is necessary to praduce full effect and also to exclude favaaritism and intripue. On the whole I do not see haw Government can safely take upon their shoulders the risk of failure and am not very sure it would be desirable to do so if they could I would prefer to minimize the risk by expedients noted above and below—paragraphs 18 and 21.

20. It has been suggested that Government should go Construction of wells by still farther than this and undergovernment seems. Take the construction of wells on a wholesulo scale. I am entirely opposed to this. It would be a serious advance on a wrong line—the line of doing for the people what they can do for themselves. If wa build their wells wo nay as wall huild their houses. An experianced cultivator can judge bettar than any Government agency whether it will pay or act to make a well in a particular field. If he undertakes the risk and trouble it is the hest guarantee we can get that the position is suitable, i.e.,

near the village, that the soll is suitable that manore is arsitable, that water is likely to be struck. He is much more likely to be right on these points than a Government officer whose only interest in the matter is to show n return of work execute 1. Grauling however for the moment that more likely to be right, on these points than a Government officer where only interest in the matter is a shown return of work executed. Granting however for the moment that the latter is as good a judge as the former, the next question will be, who is to pay for the work? If Government is to pay, every one will want the free gift and have an equal sight to it and very few will be able to get it. Thus would have to be excluded where sub-soil water was indifferent or who could not use a well far mont of manner or would not for laximes (there are many such). In the weeling out of such holders heibery would be rampant, but even if they were fairly eliminared it cannot be seriously contended that the remaining lacky ones should be sopplied with a well at the expense of the State. Yet the cost could not be charged on them either in lump or by enhancement of the ass-sment at the sup by of the guaranteed term without their cancot, and no man in his sense would give his consent to have his work done by the Public Works Department. Not only would it be twice as expensive as if done by himself, but no man would willingly bring about his place a gang of subordinate efficials with their impertinent swanger and lard and fast rules when he could get the work done by his own people whose interest it would be to conciliate him and meet his wishes. The number of wells already in the country that he unoused is remarkable, either because of the badness of the water on because of the laximes of the owner or his wont of means in the shape of taskle, bullocks, mauure, dependants to help, watchmen to rrutee the valuoble erop. The resolt of a system of Government well-digging would probably be to greatly increase these unfrautial assets. "Three seres and a com" may be the ideal of reatio prosperity in Eng'and, but "three acres and a well" is by no means it to quivalent in India, though pupular writers often argue as if it was.

21. There are tracts where the surface water is sweet

21. There are tracts where the surface water is sweet 1Rep boring.

and scanty but where the people will on no account go deeper from a well-grounded fear of striking on brackish springs. In

others there is not even an upper sopply of sweet water. As things at present stand, noless there is an advacent river there is eathing possible in such tracte except perhaps a canal like that proposed from the Sabarmati. There are however indications which give some loop that in places deeper water still, free from all, with a head upon it, may be streek by deep boning which should be at stematically undertaken. In Brooch town there is a well in which from a depth of mere than 100 feet the water rises of itself to above the river level. In Virangam town, if my local informants are correct, a pipe was driven down below the brackish water and after it had tapped a lower and sweet epting was binken, that in jet of sweet water still wells up 2 or 3 feet above the top end of the pipe. It was in this line of rountry that Mr. Griestach recommended trid borings for an artesian well. Deep horiog porties for special areas should be organized, can under a supervisor who should be a skilled wechanic. They should porate wherever the general results are likely to be most instructive, but they should be free to bore in a private holder's land on terms as suggested above. land on ferms as suggested above.

22. It is not irrelevant to mention that in this province at all events the beorbeial avults af irrigation depend directly on supply of manure. In the best villages that is the real check on the increase of wells, for no shrewl cultivator will check on the merease of wells, for no shrewl enlitivator will spend money upon water unless he can make sure of keeping up the fertility of his land. It is antipusing how little has been done to lead the cultivator to exercise economy and resource in this matter. The used has become greater than ever here since the famion reduced the cattle by 70 percent. Mr. P. K. Subtinh's note on "Different systems of housing catto and conserving manner" published as an "Agricultural Ledger" is being translated into Gujurati and, if opproved by Covernment, should be circulated a very village. There are few now which do not contain some cultivators who can read and write, and much good might be done by the dissonination of useful agricultural information in vernacular leaflets. That however is wandering heyond the scope of this note.

- 1. Q. (The President.)—How leng have you been Commissioner of the Northern Division ?—About 5 years.
  - 2. Q. Were yoo here all through the famine !- Yes.
- 3. Q You have enhantited a very interesting memorna-dum. The opining pringraph as regards the silting up of the months of these rivers reveals a very serious matter and one that should be investigated ?—Yes, it is a very serious n atter indeed.
- 4. Q. You say in paregraph 3, "In the sandy soil of Purantij taluka the Hathmati Canal has been a failing because among other rousans, the loss in the channel by percolation is engineous and because the rice beds will not hold anter without great wastage "?—Yes, the country is not saited to rice cultivation. saited to rice cultivation.
- 6. Q Is it not worth while osing the water for wheat and barley?—Undoubtedly; it is used, when they can get water in the cold weather.
- 6. Q. I gather from the note sent in by Mr. Beale that 6. Q. I gather from the note sent in by Mr. Beale that measures have been taken to prevent the loss from the Canal; assuming that this is effective, would the canal then be a success, if the nater did its full massare of work?—I should not like to speak definitely. My impression is that the result has leen already to deteriorate a good deal of the land hy efficience and the general complaint of the vallagers also is that the land is getting exhausted because their supply of manner is not sufficient; the water being brought to their deers tempts them to over-water and over-crop the LeTa.
  - 7. Q. Is the efforescence on the increase !- Yes.
- & Q. bill it not exist before the Canale were started?-I cannot say, it probably did.
- 9 Q. You say in paragraph 4 "The only tracts where a canal supply would be welcomed by the people are a lopic! for rice fields, the land leing a list more or less with long." for nec heids, it clead leng a feet more or less with lorin. It state out yout in Enjand amorting to these conditions where it is likely that even trigation can be introduced?—If it would be more or less the line the Salarwati event is supposed to take, whether it is derivable or not take question; it would less to the people growing a second cup that notify the chiefly reculsted by the supply of nature; there is no doubt they would grow barley and wheat.

- 10. Q. You say the canals are broken reeds, for the water fails in time of need; would it be worth the cost to have a thorough survey made of the catchment husins to the north of this District, to see whether it was possible to store water?—Yos, especially in the Panch Mahals.
- 11. Q. The best plan would be to have the catchment basins exhaustively examined f-Yes, certainly.
- 12. Q. We were a sured that brackish water was very good for barley P-Yes, if it is not too brack'sh; nod it is not had for wheat.
- 13 Q. Mr. Mallison says it is to be recommended for tolonces? -Yes, particular salts.
- 14. Q. You say in paragraph 7, "I have only to suggest that preference given to peaple who contribute 10 per cent of the cost should be abrogated. This would leave the Public Works Department entirely free to take up systematically groups of tanks year by year which will tend to economy and theroughness." I thought that the Public Works Department, quite apart from this rule, takes up any tank needing repules?—A certain amount of expenditure gues on, and as those who pay 10 per cent have the preference, the others are more or less out of it.
- 15. Q: It seems to me a little hard that if villages are willing to contribute a share that that willingness should not be taken as an indication that their necessity is great and that prefer nee should not be given to them?—That simply means that they are ready to pay more than is due from them rather than unit get it at all.

  16. Q. Do you think there is a moral obligation on the State to keep these tanks in order?—Ye...
- 17. Q. I beliere that when the last Remane Settlement 11. 12. I believe that when the last Review Settlement was trade they were in such had order that the Settlement was made him in consequence. If the cultivator found, is could not irrigate from a tank and he asked for a remission, would it be given to him?—Yes, the huddedar often at this from as ing for a remission, believing that if he gets it, it will mean currendering his rights.
- 15 Q. We heard that there are 1,200 tools in Almadatad? -Yes.
- 19. Q. Would it be possible to fix a certain limit for those that Government declines to repair and make a remission if no repairs are made? That is already done.

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- 20. Q. And the assessment remitted?—We remit the assessment if we are asked to.
- 21. Q. With reference to what you say about sloicee and bunds in paragraph 11, this refers merely to using the broad channel of the river ?—Yes.
- 22. Q. Can you quote a case?—Yes. Colonel Present who was a very experienced officer here 30 or 40 years age strongly recommended that a great deal might be done on the River Sheri by making bunds, but that is a point that requires very careful examination, it is the common hellef that the water is "chapadae" (creates a only soil).
- 23. Q. We were told yesterday that Sowcass declined to lend money for the construction of wells?—I don't nt all helievs that they wou't lend money for wells in ordinary times.
- 24 Q. It was said that the bania would not lend a large sum?—He would lend money if he was sure it was being properly used; as a matter of fact no rayat can dig a well without help from the bania unless he gots takavi from Government. If a bania is satisfied that the money is going to be properly spent he will lend it.
- 25 Q. I gather that you do not think there is any material inconvenience caused by delays in granting advances ?—No.
- \*\*6. Q. We heard yesterday that there was sometimes five and six months delay?—Tout would be exceptional, I think. It depends upon the personality of the officer concerned; there need be no great delay.
- 27. Q. Do you think it would be a popular measure and an expedient one instead of giving advances, merely, to give the money and access wet rates in future?—I should think it would be accepted with reasonable arrangements, but a man would sooner have the well his own property.
- 28. Q. It would be his own property all the same?—As long as there is necessment be thinks it is likely to be increased.
- 29. Q. You suggest the reduction of the rate of interest to 3 per cent, would it stimulate the construction of wells largely it Government were to give it free of interest alt gether?—Yes, I think it would.
- 30. Q. As a famine protective measure? Tes, I should think so.
- 31. Q. If it was given out on these terms for the next ten years or something of that sort?—The Government made a similar concession on takavi advances during the time of famine and it was very much appreciated.
  - 32. Q. The moral effect would be good !- Yes.
- 33. Q. You think that one cannot go wrong in multiplying good wells?—Not if the people have the construction in their own hands.
- 31. Q. You say in paragraph 16 "A general concession I would suggest is to recover by easier instalments than have hitherto been usual" and that "ropayment should be spread over 20 years or more." I understand the law allows 20 years?—I dun't think the practice is so.
- 35. Q. What is the practice?—It depends upon the idio-syneracy of the Collector, I think it ordinarily is not more than 10 to 12 years.
- 36. Q. You on the whole recommend that remission on taken should be given in everyease of the failure of a well?—No, it is a very doubtful point.
- 37. Q. Supposing a man come to the Collector and applied for assistance in boring and it was given; if that well turned out a failure I suppose you would help the man then P-Yes.
- 3S. Q. On the whole what measures on the part of Government do you think advisable to protect this Province of Gnjarat and to make it more fit to withstand famine?— I don't think anything beloic is possible; there are many useful minor measures; I should thoroughly prospect the Dohad taluka of the Panch Mahals, then, I would notycete the construction of bunds in rivers; of course the oncient system of tanks for assisting rice cultivation should be kept in perfect order; lastly, I should develop wells as freely as possible.
- 39 Q. Turning to the question of relief in famino, what is the best form of work ?-Digzing, certainly.
- 40. Q. Would you employ famine labour on small tanks?

  -Yes, because there is really nothing elss.
- 41. Q. We have heard in some places of long earthsu dykes placed across the country to intercept the water,

- would you recommend that sort of work?—They would only be possible in certain localities, e.g., to in except the fixed water in the central and weeken parts of Ahmadabad. I don't think it would be possible an any large scale owing to the conformation of the country.
- 42. Q. We have had some ovidence regarding the water-logging of certain districts and were told that in some places drains are locked upon with enspicion?—Undenbtodly a drain is a great been in some years and a great curse in others.
- 43. Q. We have heard the objection to a drain that it flows too fest end washes off the good soil P.—That is so.
- 44. Q. Do you consider these drains a good form of famins-relief work?—Certainly, most excellent.
- 45. Q. The famine work programme is got up, I understand, by the Executive Engineer in concultation with the Collectore; does it come officially before you?—Yes.
- 46. Q. Is it being kept up pretty well in these parts?-
- 47. Q. Is there any ruls observed as regards half-yearly or annual revision?—Yos, they are sent in annually to be ravised.
- 48. Q. (Mr. Higham.)—We have heard a good deal about the drought in these parts, but does it over happen that land is dameged by excessive floads?—Yss, before the great famine in 1899-1900 there was more damage by flood than by drought.
- 49. Q. That is to say rivers overflowing their banks P—Yes, in 1875 the Sabarmati overflowed and did enarmous damage, destroying valuable land. The country has not recovered from it yet.
- 50 Q. What was the effect of that flood !-It overlaid the good soil with sand.
- 51 Q. Does it draw up the salt?-No, it does not lie long enough for that, it runs over the country.
  - 52. Q. The only damage is the sand ?-Yes.
- 53. Q If the country is tharoughly saturated by a flood of that sort, does it have any effect on the wells ! —A great many wells got thrown ont of uso; they got silted up.
  - 54. Q. They have not become soline ? -No.
- 55. Q. Is there sait eillorescence?—Not that I am aware of; the flood comes and goes very quickly.
- 56. Q. In any proposal for putting weirs across the rivels there high floods would have to be considered?—Undenbtodly.
- 57. Q. In paragraph 5 you speak of the "dauger that projects may be adopted, as were those of the Hathmati and the Tapti canals, on ongineering rather than agricultural considerations"?—Yes, 1 don't think from an ogricultural point of view the Tapti canal is a very promising scheme.
- 58. Q. Is it not now being reconsidered P-Not that I nm aware of.
- 59. Q. I think the Bombay Government was asked to consider the question, you have beard nothing about it?—
  No.
- 60. Q. Am I to understand that on small or 'one man' tanks the water assessment has been taken off?—The Government does not take the initiative; if the people apply an onquiry is made, and if they do not get water we remit the assessment; if they get a water-supply the assessment remains, oven if Government have no intention of keeping them in repair.
- 61. Q. In coso it was necessary to employ relief labour, would it be out the employed on small tonks?—It might, but at most would not give very much labour.
- 62. Q. I mean village labour ?-Yes, no doubt, many have been repaired.
- 63. Q. Are they entered in the programme?—Yes, the small cases are clubbed together in one item.
- 64 Q. You say in paragraph 6 that tanks are never in use for rabi irrigation, because they are very shallow and dry up at the time when water is wanted; if the tanks were deepened so as to hold more water would the people lift water out for the rabi crops ?—I am efraid not, some of the more energetic night.
- 65. Q. The cost would be more than they are willing to incor ?—Yes.
- 66. Q. You say in paragraph 12 that steam pumps on rivers should be encouraged by Government by imposing reasonable and aniform conditions, is it necessary to impose any conditions at all?—It is a matter in which. Government os general landlord may impose some conditions.

- 67. Q. Woold Covernment have any locus stands in imposing conditions ?—Yes, as propeleter of the water of the
- 65. Q. The Government is not the exclusive owner of the river, is it :- I should say so.
- 69. Q. As regards the Saharmali canal, you don't seem to be very strongly in fartur of it?—No, I would only strongly advocate it in a year when we were very hard up when it might be worth trying.
- 70. Q. Do so s not think it would have any processive value f-I deakt if the value would be commensurate with - the cost.
  - 71. Q. (Mr. Ithetson.)—I gather that you don't agree with the opinion which has been expressed in the papers by some of the witnesses that famine is so may in Uniarat that it is not worth while apending money to stated the Province i—No.
    - 72. Q. When was the last great famine ?-In 1913.
  - 73. Q. How long have you been in Gujarat ?-Thirty 3 Cars.
  - 74 Q. Within that 90 years has there been anything like severe distress or searchly of any sort short of famino?-No, there has never been any need of relief works until the recent faming, there were a few works in the Panel Mahala in one year.
  - 75. Q. Can you tell us suything of the period between 1813 and the time uver which your experience extends; may-thing about the previous 60 years !—I should not like you take my information as exnet, but there have been years of scarcity.
  - 76. Q. Was there no distress in 1877 f-Yes, there was local distress, in the district of Bronch especially; the crops failed locally ewing to attacks of gense-hoppers; it was a terrible year to the Decean but not in Gujaint, and there was local famine about 15 years before that.
  - 77. Q. So that we have had three famines in the country owing to drought in which there has been no need for relief norks in Gujarat ?- Yes.
  - 78. Q. Speaking of the Hathmati canal, there seem to be two complaints
    - (1) the rice beds will not hold water;
  - (2) the supply of manuro is limited; supposing it was possible to substitute rabi for ries, would not that meet both difficulties, rabi requires less water than ries?—I don't think that anything practical is possible. The cultivator would never be induced to believe in it. He would have no culticate in the suppl. of water labling out for the rabi. I thank myself that it might be en advautage
  - 79. Q. In regard to the moral obligation of Government to clear the tanks; we were told resterday that at the revision of Settlement the state of regain, in at ich each tank was, was taken into account and the newspurnt was lowered in consequence, and we understood the negment to be that that this removed the obligation of Government to elear the tanks; do you agree with that !—!!! as regards land which received no water at the time of the terration of settlement.
  - 50. O. If Government now spends moved on these tanks and restores them to their original cardison it might take additional assessment on an open of the isir'y tale additional accessment on an ount of the improvement on the land already assessed !-- It it given a better supply.
  - 81 Q. You have said that if 100 acress are under the tank the first hard to suffer by the insufficient supply is the more distant hard which less its irrigation altegather and that the assessment on the jareduced but not that on the rearr lands. The respection is in the aria irrigated, not so the quality of the supply !-- Yes; the result of clearing it maks would be to water the more destant finds which el will be assessed again, within the time of settlement.
  - \$2. Q. Have you had many applications for a reduction of assess ment on the prounds that the tank is writed repair and the supply of water insufficient F-Applications of that had don't come to me, but es Colle for I remember they mel to come ju.
  - \$3. Q. 140 you think that the number of such tanks tests a relatated projection to the number of tanks which are filled?—A given menter of people don't get water who have to any fir it; they believe that the tanks will be repaired asymmetric transit by obtaining a reduction of any amount to by would surrected their rights

to the water. There is muchler reason, and that is that the Mr. Lity. water rate is included in the consolidated as-essment, and they don't realize that they pay for the water.

- 81 Q. In the case of very small tanks, if Government has decided not to repair them and was perpared to remit the water maximum and it be possible to get the people to keep them?—It would be difficult to get them to comlane.
- 55. Q. Seeing that Government is not prepared to do the work and that the people cannot, would lot all foods he a possible agency. Supposing Government were to allow Local Boards to take the met assessment that may fairly be assessed on the land, and an put them in funds, could not anything be done?—I should not address; they are the worst agency you could have.
- 86. Q. You don't hope much from them, even supposing that the money difficulty is not over?-No. 1 signalized rather to trust to the agency of the people.
- S7. Q. No you think the people might be induced to make small tanks ?—They might, but there would be a dif-ficulty in obtaining land for the tanks.
- 88. Q. Yan my in paragraph & "I am myelf of opinion that as a rule enough is not circlifed to water". Do you know what the system of circlifed to water ". Do you know what the system of circlifed to water are survey question; I don't think it is of much principal account; the sa-essments are consolidated, the separate assessment for water does not appear in village records.
- 89. Q. Is it not important that Government should know exactly what it gains by the tanks?—Yes; I think it is generally underestimated.
- 20. Q What is your opinion based upon !- I understand the general pelneiple is that the heavier the samfall of the country the higher the water-rate; in Konian I believe thoseil rate and water rate ato equal. Here, in Gujarat, where there is less rainfall the mater-rate is considerably less as n rule than the soil rate.
- 91. Q. You think it should bear a larger proportion P-Yrs, the amount credited to the water should correspond name or less to the net produce af irrigated as compared with that of dry lands.
- 92. Q. Your opinion founded upon experience is that that is not the case ?- Yes.
- 93, Q Do you think the error is to the direction of crediting too little to water ?-Yes.
- 34. Q. tMr. Muir-Mackensie.) The scarcity or abandance of rainfall is not a legitimate ground for a higher rate P-Not, if it is fully replaced by artificial watering; it does not matter to a man whether he gets his unter from a tank or the heavens. I would credit as much to the inuka in Ahnadabad as to the heavenly supply in the Konkan
- 95. Q. (Mr. Mbbetson.) Would you extend the number of tanks largety P No. 1 don't think I should, in propering a survey I had in view atterage tanks. I would not unterest the number of progniou tanks
- 96. Q. By irrigation tanks you only refer to noe that holds enough water for rice !-Yes.
- 97. Q. Would you advocate large storage tanks i-Yes, where they are possible.
- 98. Q. Do you think they would payquestion? - They would not east to begin with a not in the tauch Mahala certainly us the people are not accustomed to irrigation, they would soon learn it, there is a great market for rice in the Panch Mahals.
- 99. Q. (The President.)-They might be carried on as Inmino relief works ?- Yes.
- 100. Q. (Mr. 16betcon.)—In Gujarat have they had any appreciable effect on the wells!—Yes.
- tot. Q. Such an effect as to materially iceresse their yield?—Yes.
- 102 Q. Supposing Government were to make a large tank in a tract in which there were tells, sport from the actual irrigation from the tank, would it excreme a material effect upon the prosperity of the tract through the wells?—Certainly; tanks sweeten the brackish water of the wells in Gujarat, and in this way do increase the prosperity of cirtain tracts.
- 102. Q. Would not the tanks be entitled to some credit in consideration of that improvement?—I'm afraid that is would be difficult to estimate the amount; there would be romany s' sites ef effect.
  - 101 Q. It las nesci icen done i-No.

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- 105. Q. As to o s, what estimate did you form of their protective value in the late famine; how did they work?

  —As a matter of fact they wore very disappointing; in the cold weather of the famine year they were immensely extended, but the crops were very poor, owing, the people said, to the ground not having been mined upon.
- 106. Q. Their protective value was not very great ?-
- 107. Q. Does their snpply decrease year by year in the cass of prolonged drought?—Yes.
- 108. Q. Were they very disappointing this year?—The rabi erop promises rather well; but as the water-samply in the wells is much shorter, the area will be smaller.
- 109. Q. On the whole they do afferd a substantial amount of protoction?—Yes, especially as regards fodder.
- 110. Q. Apart from the takavi question, have you any suggestions to make us to the means of stimulating the construction of wells by the people?—1 don't know of any means except takavi.
- 111. Q As regards 'the rule of exemption from assessment I am maions to get your views; it is of great importance to know how it works, we have been told that the people thomselves have a certain amount of want of confidence in it; what is your experience, do you think that is so?—No, I should say not; I don't think the whole of the population thoroughly understands the intentions of Government, but they are gradually learning to understand.
- 112. Q. Would a cultivator who had made o well and whose rate was onlineed on account of n rise in prices realize that the enhancement was not due to the well?—Yes, I think so; his neighbour who had not made a well would also have his rate enhanced.
- 113. Q. Do you think that as a rule Government does arrive at the one object of exemption—the stimulation of private enterprise?—Yes.
- 114. Q. How long has this policy been at work?—It was legally estublished on the revision of the Code in 1886, I think.
- 115. Q. (Alr. Afair-Mackenzie.)—Was it not working before that ?—It was then unde plain in chapter and verse; I should be inclined to date it from 1886.
- 116. Q (Mr. Ibbetson.)—Do you think the people's knowledge of the principle might date from 1886?—Yes.
- 117. Q. Do you think the number of wells has increased much more rapidly since 1886, apart from famino years?—I cannot say one way or the other, in any ease 15 years is a short time.
- 118 Q. Can you tell us any facts in support of your statement regarding the stimulation of private enterprise owing to exemption?—I cannot say. I have no statistics.
- 119. Q As regards the effect on the ordinary rayat, do you think that he would make a well on promise of promaneat exemption, when he would not make a well on promise of exemption for 30 or 40 years?—I think it would make a great deal of difference.
- [Mr. Muir-Mackenzie rend out figures relating to wells in Gujarat and atated that from 1886-87 to 1896-97 there had been a very small increase.]
- there had been a very small increase. I

  120. Q. Now in regard to the question of recommending oertain leniencies and liberalities in order to stimulate the construction of wells, such as the reduction of interest on lone and remission of advances seme of which you yoursolf suggest, the cost of these must of course como out of the public purse. In Northern India we can recommend them on the ground that although for a time Government will lose money, still if extra wells are made after a period of exemption there will be a financial return in the shape of enhancement of direct revense; in Bombay where the exemption is permanent there is no such prospect; whatever is given is lost for ever; and except as regards the general prosperity of the country there is no financial return?—No, there is a considerable return to the raynt, though not to Government.
- 121. Q. If you make the rayat a present of the interest on a lean of Rs. 1,000, you take it out of the packets of the people of the rest of India. What I wish to point out is that in one case you get a return but not in the other, and that where the exemption is permanent it becomes more difficult to support the measures of leniency which you recommend. Take a province in which the term of exemption is limited, say, to 30 or 40 years; would you have the exemption permanent or would you grant the more favourable terms as regards interest and remissions; which concession do you

- think would have the greater effect in stimulating private enterprise?—Why not both?
- 122. Q. If you could get both, the quostion is in which way we should he more likely to stimulate private enterprise in each a province; whether by the proposed measures of Isniensy or by changing the 30 or 40 years exemption into a permanent exemption?—It would depend much on the view of the individuel landholder. We might give him the choice hotween making his well with aid from Government liherally given with exemptions for a limited term, and making it without aid from Government with permanent exemption.
- 123. Q. Do you think a reduction from 5 to 3 per cent. interest on teknyi would actually induce n rayat to make wells!—I think it would be a strong inducement.
- 124. Q. Would it induce him to make wells when he would not ordinarily make them ?—Yes.
- 125. Q. Your well protects (not vory effectually) 2 to 4 acres in one year of drought ent of 30, is it worth the while of Government to parchase that amount of protection by remitting the interest on fakavi leans for wells?—The protection in a famins year does not represent the total benefit by nny means.
- 126. Q. You think it would be worth while on the whole?—Yes.
- 127. Q. You say in Gajarat a bania will lend money for wells at 6 per cent.?—Yes, to a good substantial rayat.
- 128. Q. (Mr. Muir-Mackenzie.)—Would he do it in any district?—It would he done in Sarnt. I don't doubt it would be done in Breach; I am speeking of pre-famine yenrs; the security here is more valuable than in the Decenn.
- 129. Q. It is not restricted to the patadars?—It is restricted to n man of repute in the village.
- 130. Q. To large land-holders ?-Not necessarily, it would depend upon the character of the man.
- 131. Q. Would a man holding not more than 10 acres have any chanos?—If he is otherwise a man of trust there whald be no difficulty in his getting it; sometimes a bania goes shares in the well.
- 132. Q. (Mr. Ibbetson.)—You recommend recovery of loans by 20 instalments; it has been proposed in some quarters to allow 50 ?—I think that would be too much.
- 183. Q. Would not the risk of the well failing, or turning salt or falling in be a substantial danger to Guvernmeet if it increased the number of annual instalments to 50; the longer the period of payment, the greater the risks?—I don't think it would be worth while to prolong the agony beyond 20 years.
- 134. Q. You lay considerable atress apon the rigidity of recovery, do year rules allow the postponement of instalments?—Yes.
- 135. Q. Are the rules noted upon?—Yes, it mainly dopends upon the good word of the village accountant.
- 136. Q. Can you saggest any way in which this rigidity coold be tampered?—Nothing, except by making the instalments so small that they would not be felt.
- 137. Q. We find complaints that the dolay in granting takevi caused by enquiries as to solvency, etc., is one of the serious objections of our system; are such enquiries necessary seeing that by law the loan is the first charge npen the land?—Yes, I think they are; Government cortainly have the right to supersede the banta, hat I doubt it would be vise or just.
- 138. Q. Yon say that you hesitate to recommend a remission where the well falls in ; supposing we only gave remissions where e well was constructed on a site approved by Government?—I don't think that would work.
- 139. Q Supposing that we had approved of a site after a trial boring and that the well failed?—Then thore would be good reasons for giving a remission, but I thiak that would be extremely rare.
- 140 Q. There is mother suggestion that Government might only remit a portion of the advances !—I should object to that, as there would be a question of how much it should be.
- 141. Q. Does the absence of any tonanoy right preveot tenants from making bunds, etc.? The tenants don't lay out money on the land.
- 142. Q. Would not the old owners do it 1-If they are protected they do sometimes.
- 148. Q. You don't think that the absence of protection operates so as to restrict extension?—No.

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- 144. Q. (Mr. Rajaraina Milr.)—In teplr in a question by Mr. libeton, you sail that there was in the case of most of the tanks a surrender of assessment at the revised settlement and consequently the moral pullcation on the part of Boreroment to keep up these tanks has been removed or lesceed; so far as regards those lands which are still the second of the assessed as wet, is use reduction made in case the tank fails: -- Upon application of the huller enquiry is made and it the tank is found to have failed the assessment is proportionately reduced.
- 145. Q. What amount has been spent on the repair of tanks during the post 16 or 20 years?—I cannot tell you.
- 145. Q. The number of wells in your division has not very largely increased ?-No. I believe not.
  - 147. Q. Might it be due to the present complicated system of inquiry regarding loans?—It might be due to some extent to the complexities of the system, marvoidably so, as we must be sure of some security. I don't see why there at call to any undue delay at all; we are now beginning a rew special regard to takent for which there was no denered before the familie; we ought to see a new development during tho next few years; the system seems to be as simple as it can very well be made; a man asks for money, you make a reference to the village officers and if the country is attlefactory be gets it. if the enquire is actisfactory he gets it.
  - 149. Q. Huw lung does it take ?-It need nut take a month; sometimes it is the man's own fault; people have a light of going the last day and expecting the whole thing to he done in 24 hours.
- 149. Q. You said you are not in favour of granting remission of takari; if special cases are enquired into by Divisional officer would you still refuse to grant a remission if he is satisfied that there has been no fraud and that the rayat honestly spent the maney?—I have a horror of special cases myself.
- 159. Q. Do you think the Collector coold make the enquiry ?—The Collector is a very hard worked m.m. cases for special treatment would be very frequent once that was lail down.
- 151. Q. At the end of paragraph 18 you say " these conditions are often ubsent." You don't refer to ony difficulties in takavi?—No.
- 112. Q. With reference to what you say in paragraph 15 is there at present anothing to prevent an other earrying the money and paying it on the spat?—It is not a desirable thing to entry large sums of muney about on account of the fear of theft.
- 153 Q. Is there anything in the present rules to prevent an officer doing sof-ho, except that there would be account difficulties. I don't say they cannot be overcume.
- 151 Q Have there has many eases in which takars, at a portion of it, has been remitted owing to failure of wells? Nut that I am aware of.
  - 155. Q. You say in paragraph 20:" the number of wells already in the country that lie enused is remarkable": are there any statistics to show the number of wells unused?—I am not aware if there are any.
  - 156. Q (Mr. Mair-Mackenzie)—Is there any reason to behere that the water-longing which has been observed in certain area in a been proceeding more rapidly in recent years?—That is my impression. I cannot give any very definite grounds for it.
  - 157. Q. In your long experience of Gujerat do you know whether there has been a large extension of unter-log ring f-Yes, we have heard a great deal more of it in terent years, especially in the Mutar Taluka.
  - 158. Q. You attribute that to the silting up of the sire-si-Yes, chiefly the Sabaranati; it has become very much silted up during the part liftern years.
  - 159. Q. I understand from your memo, on the Aukleshvar report that non-fear the silt would beat all efforts to drain it?—Yes.
  - 160. Q. But do you think that the desire which have been no led have not even temperatily mitigated the will. I have no d will they have temperatily mitigated the evol.
  - 161. Q. Are you able to say whether it would be a long time lefter the effect of the drains would be neutralized?-It would be some time but not very long.
  - 102. Q. Hare you seen ray of these lands in which surface rolls have be a injured by drains i-No, I have beard of them.

- 163. Q. You cannot say whether the injury extends over Mr Lely. a large portion or the whole of the drain f-I cannot
- 104. Q. Du you consider that the rayate are likely to take up con-bletable sums as advances on their joint responsibilite for the purpose of digging tanks ur improving old tanks?—No. I have never seen any signs of it.
- 165. Q. You don't think the people are good judges as to sites of tank-?-Xo.
- 166. Q. Would they make greater mistakes than as regards wells i-They would be much less excusable mistakes.
- 167. Q. I thought you said they were good judges as regard wells?—Yes, they are good judges, but not as good in the matter of tanks
- 16S. Q. You say in paragraph 3 "the people would certainly not take comal mater in the black soil country between the Tapti and the Mahi rivers or in the west of the Ahmadahad district. It would also be superfluous in land so retentive of maintage." Would it be superfluous in a year of drought ?—No; in such a year as this it would be anperficous.
- 160. Q. What about 1820 f Of course that was different; it would be superfluous this year when the cotton would have done excellently had it not been fur rats.
- 170. Q. Would it not pay to substitute rice for cotton cultivation?—I don't think you would gain anything by that.
- 171. Q. Desarice not pay better than cotton? —It may; but I don't think you would gain anything by substituting rice for cotton, they are both valuable crops.
- 172. Q. On the other hand there would be this advantage that cand water would be available in a year of extreme drought without any loss to the people?—Yes, no doubt the question is whether it would be a gain to Guyermoent in urdinary years.
- 173. Q. If rice is more valuable ?-It is fully as valua-
- 174. Q. It might pay a moderate rate f.—In an arrange year rice is grown un the understanding that there will be enough rain to mature it.
- 175. Q. Still, tanks are a good prefection f—Tanks are chiefly intended for years in which the rains fail, but I don't think the rayat would pay Rs. 7 for a last watering; it is a question I have discussed with men who ought to know what the rayat would be willing to pay for extra water from the canal. Some say he would take water from the canal in any case. I should not have thought so myself.
- 176. Q It is admitted that salt water is useful for certain crops, such us barley ?-Yes.
- 177. Q. It was said yesterday that in certain barley tracts it might be dangerous to sweeten wells ?—I abould not be luclined to go so far.
- 178. Q. You say in paragraph 6 speaking of irrigation tanks " their necessity is based un the fact that in probably 3 years out of 6 the early rainfall antheen for sowing, bany 3 years out of 5 the early familial sumes 1 or souring transplanting and bringing the rice plants forward, but fails at the last when water is needed to mature them." Is it to be inferred from this statement that in 3 years out of 5 free is un utter failure?—Perhaps 2 years out of 5 would be safer; in 2 years out of 5 rice crops not protected by tanks are a failure.
- 170. Q. Rao Bahadur Ithimbhai has estimated the area anprotected at two-thirds and that failsf—Yes, perhaps if a rayat could secure a good crop in 3 years out of 5 is would be enough for him.
- 18). Q. With regard to the repairs of tanks you would be glad to see this 10 per cent, contribution altogether abolished P-Yes.
- abolished P-Yes.

  181. Q. In a Memo. I base obtained from the Public Works bepartment I find that in this Division there are estimated to be 1,178 tanks requiring repair, the cost is estimated at Rs. 5,20,000, and a suggestion is before the Gevernment that these reprints should be excented systematically throughout the period of 20 years; would that sait the case or would ven prefer that the period should be materially stortened P-1 should prefer 20 years; I understand that the tanks sait up in that time.
- 182. Q Now that it has been definitely ascertained that three 1,178 tanks require repair, would it not be advisable by a spinion to concentrate famine labour upon these tanks?—Yes, that has always been in my much.
- 183. Q. (Mr. Illerson)—Is the sum of Rs. 5,25,020 are and or spread over 29 years?

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Mr. Muir-Mackenzic .- That is the total amount.

Witness.—I believe the reason why more has not been done is becouse they are small works and there is a general objection to small works?

184. Q. (Mr. Muir-Mackenzie)—The fact of their being small works would not make it impossible to take them up as works of famine administration?—It would certainly be more difficult but not impossible.

185. Q. Would it require much revision of the existing programme?—No, in the programme a number of works are clubbed together.

186. Q. With reference to what you say in paragraph 8 the whole question of remission of land revenue is under the consideration of Government, is it not?—Yes.

187. Q. Up to the last cycle of bad years do you think the people have found serious difficulty in paying their rice assessment?—It must have goue very herd with a man wha lost the whole of his crops.

188. Q. Has there been any difficulty in getting it out uf them P-No, his land is too valuable to risk and he could always raise the assessment from the Soucar.

could always roise the assessment from the Sorear.

189. Q. With regard to what you say in paragraph 18 about wells, your general view is that only a substantial man will come forward and execute works likely to pay, but does not the general argument you have used militate against the giving of water cheap by Goverament, at least by the large system of canals as in Northern Indio?—As I understand, the canal water is loid on the ground by natural flow almost invariably, the canal rate would not be much more than the equivalent of the labour of lifting water thus saved—in the case of a well the cultivator has to inear heavy expenses, quite apart from the cost of sinking, that is, bullocks and labour.

190. Q. I understand that you prefer the system under which the cultivator will get his water dear ?—I look upon

that as a check against injudicious irrigation to which attach the greatest importance.

191. Q. Supposing the advantage to the land from the water to be equal, would you profer to see land in Gujerat irrigated by wells rather than by canols?—In Gujarat certainly.

102. Q. I believe you strongly approve of the grant of takavi liberally in the early stages of famine for kachcha

193. Q. Would the end of October be too early if min has failed by the end of September?—No.

194. Q. Do you think the people will again become backward in taking takari when good years roturn?—I cannot sny; the low rate of interest charged by the bana may be an obstacle; that is one argument for lowering our rate.

195. Q. You have suggested that Government should take precantions to find out whether, by horing, a well is likely to succeed; would the data collected by the Survey Department he of coasiderable use?—They might be of some general use, but being on the spot is the only thing.

196. Q. Would drainage in your opinion be an effective remedy for salt effloresence or deterioration coused by over irrigation?—I think that is the generally accepted view, I know nothing about it myself.

197. Q. You said a bania often supplies the capital for a well and taken a share of the produce; would it not be advantageous for Government to supply the capital for the well and take instead the bagayal assessment?—I don't see m'ry that should not be done.

193. Q. You have no objection to ecciog it uffered ?-No.

199. Q. You don't think it would create mistrust, as engendering the idea of cuhauced assessment?—Not if properly managed.

## WITNESS No. 21-ME. FARDUNJI CONVERJI TARAPURYALA, C.I.E., B.A., L.C.E.

## I .- Answers to Printed questions.

Mr. Tarapur-

## A .- GENERAL.

Question 1. The answers below refer to the Ahmadabad District in which I have sorved off and on for a poriod of 14 years. They also cover the Khari Slaices District in Matar Taluka of Ksira Collectorate, the Khari Slaices being under the Excentive Engineer, Abmadabad District.

No. 2. The average of the minfalls registered at Ahmodahad for the lost 20 years during each month is as follows:—

01107	Lill town					
	January			•		Inches. 0.04
•	Fobrary		•			0.09
	March	•		•		0.00
	April .	•				0 03
	May .					0.27
	Juns .				•	4.59
	July .					12.61
	Augost		•			670
	September					4.48
	October					0.38
	Novomber					0 29
	December					0.07
No.	3 (1).—No. 3 (2).—No. 3 (4).—No.					

. No. 3. (5).—Yes, as regards the Khari Cut Cannl, the Kharl Sluices and the tanks. The obstacle does not exist in the case of wells in average years.

No. 6.--No.

Soveral potitions have been received during the last few years from the people of South Daskrei for the extension of the Khari Cut in Ahmadabad Collectorate and also from the people of ex-kalambandi villages in Motar Taluka of Kaira Collectorate for supply of water from the Khari. Petitions have also been received from Dholka Villages for

n caual from the Sábarmati. In several cases the petitioners have offered a free gift of land required for the canal.

## B .- CANAL OF CONTINUOUS FLOW.

The Hathmati Canal and Khari Sluices fall under this head.

No. 7.—It is difficult to answer this question definitely, but roughly speaking irrigation may be said to increase the value of the produce of the land by 40 to 100 per cent. In average years from one or other of the causes enumerated in the question. In years of severe drought such as 1899 and 1901, when the supply in the canals almost completely fails, very little or no irrigation is possible.

No. 9. The water charges per acre on the Hathmati Canal are as follows:—

a rollows:	•							
Crops.						Re	te per	2076
Rieo	•	•	•	•	•	•	3	
Rabi	•						2	
Peronnial	1						10	

The water rate on this eanel is charged on the area actually irrigated.

No. 11. None to speak of. The Hathmati Canal is of 25 years' standing, and the Khari Sluices have been in operation from time immemorial. On the latter system the area of khar land is about 10 per cent. of the area irrigated and is not perceptibly increasing. On the Hathmati practicelly no land bes turned salt by irrigation.

## C .- CANAL OF INTERMITTENT FLOW.

No. 12. The Khari Cnt is the only work falling under this head.

(1) It has got three sources of supply, viz .:-

(a) The surplus water of Khari River after satisfying the requirements of the Khari Sluices District which has, by the sottlement, prior claim on the Khari River water. The surplus water is turned into the Khari Cut at Raipur by means uf a weir with revolving sluices.

- (b) The water from the catchment of the Chandels tank which is the principal reservoir of the Khari Cut.
- (c) The surplus water of the Hathmati Canal which is surplan water of the Haitman Canal when is brough the down to the Khari through the Blujwa Channel taking off at the 5th mile of the Haitman! Canal. The Bunjwa Channel has been recentic constructed and has as yet been little arailed of nwing to the scanty supply of the last three years.
- (2) The maters from the three sources above named are stored in the Chandola Tank and thence distributed by changels to the lands as required.
- (3) July to October in years of omple or scanty minfall; re is hardly any supply in years of drought such as 1800 ther and 1901.
- · No. 13. 17de answer to question No. 7.

No. 14. The value of irrigation is not much affected by the too late commencement or too early occasion of the supply, if the supply in September and October in which water is most required is ample. If the supply in these months fails, the value of irrigation is diminished in proportion to the deficiency.

No. 16. The irrigation is supplemented by well water in case of inte communement of rain and na supply in the referroir for rice seedlings. Well water is the need to a small extent for the last one or two waterings to him price crop to majurity if there is neither late rain nor sufficient supply in the reservoir. Rice is notor grown by well-irrigation clone; the cost is prohibitive.

No. 17. The water rates on the Khari Cui Canals are as follows :-

> . 7 per acre. Rharif (rice) . δ

ltabi . In ease of land already assessed for water advantages at the settlement, the fixed water assessment is deduced from the above canal rate for hisrif. The canal rate is invariably charged on the area setucity irrigated, and remissions are given in case of failure of crops due to deficiency of canal water.

No. 10 Secondary to constitute Value.

No. 19. See answer to question No. 11.

I have no experience of draining irrigated lond.

No. 20. Maintenance is provided for from Imperial Fande. The average annual cost of maintenance per acre irrigated for the last ten years is about Re. 268. The system works lairly well and no further legislation scens to be required.

No. 21. None that I know of.

No. 22 'I do not consider it advisable to have canals made by private persons. There is hardly any scope for them in this district.

## D .- TINES.

No 23. (1)—Tanks is the Ahmsdahad District are mostly supplied with water from their own-extendents. A few are supplied by the spill from the upper tanks, while a few others no supplied with water feam drainage

- (2) The distribution of water is arranged by the cultiauthorities.
  - (3) July to October.
  - (1) From o few acres to nearly 500 acres.

There are in all 1,256 tanks, small and large, irrigating 26,600 acres, which gives an average of nearly 21 neres

No. 21. Please see answer to quality No. 7.

No 25 Not much it there is ample supply in the tank in September and October. The crop irritated an tanks is invariably need the finer varieties of which can be sown late without much harm, but which must have a copieus supply of water in September and October to bring it to materity.

No. 26. See reply to question No. 15.

No. 28. The water rate was fired at the settlement and is paid on the whole area assessed without reference to the area actually irrigated.

No. 20. The mainterance is provided for from Im-terial Funce, the repairs being carried out by the Public

Works Department. The total amount spent in repairs doring the last ten years, exclusive of famine expenditore, who is 25,618 against the total accessed axes of all the tanks of 20,600 axes, which gives a rate of about 11 annus per acce per anama. A much larger amount can, however, he spent account on repairs. The system is monaged by the literence Department entirely except as regards repairs.

the Revenue Department entirely except as regards repairs.

No. 31. Saltian up of lanks is remorkably slow. There are numerous lanks which have not been theared for 60 person and apparely, and they are still in fair working order. Silt from tanks is to some extent removed by private people for manuring their fields. No duslinging is required as the tanks one generally dry in the hot reason. The repairs carried out to these tanks consist of strengthening and repairing the bonds rather than eleving the beds. Some of the large tanks were elevated during the last famine when the depth of silt was not found to be very great.

II .- Report on the points to be considered by the Irrigation Commission.

Norn-Questions which have already been answered above baro been omitted in the following replies.

Point No. 2.—The following areas are protected by Government Irrigation works:—

			Acres.
Hathmoti Canal	•		8,000
Khari Cut .			3,000
Khari Sluices (Kair	a Distr	ict)	8,900
Tanka			26,600

As a rule rica cultivation is not possible without artificial irrigation to more or less extent.

There is ordinarily a demand for water for rice cultiva-tion during south-west monsoon and also for sugarcano in long breaks.

The principal crops requiring irrigation are shown below :-

Ctop.	Period.	No. of watering.
Rice .	July to October	B after trans- plantation in case no
Wheat .	. November to Janu	nary 7
Barley .	. , ,	, 7
Sugarcano	. May in March	. 60
Juari .	. March to May	. 5
(Hot seaso	n.)	1

The distribution on the canals is controlled by the Public The distribution on the canals is controlled by the Public Works Department and on the lanks by the cultivators themselves, subject to the geoemicontrol of the Revenue notheratives. The programment on the Hathardt and Khari Gut Canals is realized in the shape of a water rate per acro of the area neurally irrigated, remissions being given in care of fadure due to insufficient supply in the canal. On the Khari Sluices and the tanks the irrigation rate is assimilated with the land revenue and recovered in lamp for the whole area assessed without reference to area actually irrigated. actually irrigated.

No. 3. The black sail in this district is light. Small tanks constructed in these solts hold water. There are no high earthen dams constructed, but I should say dams up to 15 feet in height can safely be constructed without n masons core. For rice, which is almost the only crop requiring principal daming the south-west moneson, that o is demand for water daring seasons of average rainfall as well as in case of prolonged drought. In this respect there is no appreciable difference between rice grown on black and that on other soils. They both require water in the latter part of the more consensuable to write on the part of owners of rice lands quality whether the call is black or gonados. A nomber of applications with an offer to pive land free of cost in some caves have been received during the last few cars from cultivators in Bankrol and Maint Tainkas for the catterion of irrigation to their villages. No. 3. The black sail in this district is light. Small the extension of irrigation to their villages.

Mr. Tara.

Mr. Tarapurvala.
5 Dec. 01.

No. 4. This question will be fully answered by the Superintending Engineer on special duty. I have at some length expressed my views in regard to the proposed Sabarmati Canal in my report No. 4013, dated 16th July 1901, submitted to Government when I was noting Superintending Engineer, N. D.

No. 5. There are in this district no Provincial Irrigation works, i.e., works constructed or maintained from Provincial Fund.

No. 6. District or village works.—Those are irrigation tanks or bunds constructed in old times. Their total number is 1,286, small and large. They are controlled by the Rossano Department, except as regards repairs which are carried out by the Public Works Department. The total area assessed on these tanks is 26,600 acros. Government in their Resolution No. 34-W.I.—419, dated 5th March 1895, have admitted their responsibility to maintain these tanks, but the matter is still under consideration, as it is proposed to absult on the tanks as are too small or on which the water-reverue is too insignificant to make it worth while to maintain them. The average annual maintenance expenditure on these tanks during the last ten years, excluding expenditure on relief works, was Rs. 2,564. No new works of this class have been constructed of late years. Such works are not undertaken by the Listrict Board or private landowners. I do not think it desirable or expedient that Local Fruds should be expended on such works. The protective value of these works can certainly be increased by deveting more money and greater attention to their up-keep and by encouraging the construction of new bunds where feasible. Those works are generally of great value as concerning village water supplies for men and cattle and supplying the wells in the neighbourhood and keeping them sweet.

No 7. So far as I know the deep-st borings ever made in this district were the two carried out in Virangam Town some 14 years ago. They were about a hundred feet deep, but the sopply tapped was meagre, and the water not very pure. Arrang-ments are now being made to make one or two borings in Virangam Taluka 200' deep, and the result of these will be anxiously awaited. Shallow beings in wells have been found in a few places to increase the supply, but moto experiments are necessary before a definite opinion can be expressed on the point. The heavy cost of boring and uncertainty of success are a great deterrent to private owners resorting to them to any appreciable extent.

No. 8. Land was being injured by water-logging in Viramgam Talaka, bot that has lately been remedied by the construction of several drainage channels during the last famine. Similarly water-logging in Sanand Taluka has been, to some extont, remedied by the completion of the Narsingpura and Ogan Brains and the partial completion of this Godhavi Gorai Drain. The last work requires to be completed. A new drain from Chekla southwards is also necessary. In Dholka Taluka there is considerable water-logging near Bag dra for which a drain has been sanctioned by Government. The drains in Sanand and Dholka Talukas are proposed to be carried out during the present scarcity if required as famine relief works. The drains ere constructed from Imperial Funds. The drains would result in increase of revenue by embiling relinquished lands to be gradually taken up again and preventing further relinquishment of land. The drains should, however, be ntilized, as far as possible, for filling tanks. Sorveys for this have lately been carried out.

No. 9. The following table gives the required information:

Statement of works carried out by famine labour in 1899-1900 in the Ahmadabad District.

Classification.	No. of works.	Total famine expenditure.		
				Rs.
Railway			1	1,54,528
Collecting road motal .			6	1,75,869
Canal exeavation			2	2,03,278
Drainage channels .			6	8,01,464
Deepening irrigation tauks			32	10,93,830
Deepening Local Fund tanks	1		80	9,42,760

It is desirable to complete as a charge against Imperial Revenues the following works uncompleted at the end of the famine:—

### 1. Khari Cut Extension-

The main channels have been completed, but the branches and distributation as well as nil masoury works remain to be carried out. This scheme, when completed, is estimated to irrigate some 12,000 acres of rice land as against 3,000 acres now irrigated. The cost of the remaining works, including the Bokh Reservoir which is necessary for securing the required supply, will be about 3 lakls. The marmal cost of the channel completed by famine labour is lls. 1,07,446.

## 2, Godhavi Goraj Channel-

More than two-thirds of this channel remains to be completed. Until the channel is completed it will be more or less oscless, and the antioipated benefit to the water-logged lands will be delayed.

The deepening of the first ten miles of the Hathmati Canal has resulted in materially increasing its discharge and preventing the growth of weeds. Last year it enabled a large quantity of water to be sont down via the Bhojwa Channel to the Chandela Reservoir of the Khari Cut. The results of completed village tanks are not yet fully apparent as the rainfall both last year and this has been scanty. Last year, however, the run-off was somewhat better and several of the tanks filled and held water.

No. 10. This district cannot be said to be ordinarily liable to famine, still a programms of works sufficient to give employment to 183,000 people for three months is ready. In addition to these n number of small village works are being surveyed and kept roady in case of necessity.

- 1. Q. (The President) You are Executive Engineer of the Ahmadabad District ?-Yes.
- 2. Q. How long have you held that office ?-For foar years.
- 3. Q. Before that where were you?—I have been serving in this District off and on for about 14 years. Before I took over charge of this district, I was Acting Soperintending Engineer, Northern Division, for about seven months.
  - 4. Q Then you know this district intimately !-Yes.
- 5. Q. You have a great deal to do with the Hathmati
- 6. Q. It is generally pronounced to be a failure from a commercial point of visw?—Yes.
- 7. Q. From the figures furnished by Mr. Reale it appears that the annual cost of irrigation by the Hathmati Canal was Rs. 198 per sore while the actual return was

- Rs. 2-34 P-In the first few years we found that there was no return at all.
- 8. Q. Why?—Irrigation was not sufficiently appreciated by the people, but gradually they began to take the water. For the first 13 or 13 years the return was very small; it did not pay the working expenses. Again, the canal was made in a tract not fit for rice cultivation, which was a great mistake.
  - 9. Q. It was made 25 years ago f-Yes.
- 10. Q. I think it was one of those projects which are marked "important" more on ongineering than on agricultural grounds ?—Yes.
- 11. Q. You have taken measures lately to regrade the bed of the canal?—Yes.
- 12. Q. With what results?—The result has been that during the last year, when there was a flood in the river, the relocity was much increased and the former drawbacks greatly remedied,

- 13. Q. There is less percolation and less loss i-Yes, and there is a larger discharge.
- 14 Q. It runs more quickly ?—Tre; owing to the slow relocity there was trouble from silt and growth of weeds.
- 15. Q. If as that reduced percolation i-Tes; scooring is now noticed in one or two places.
- 16. Q. Yoo say in your mrmo." the orea of Khar land is about 10 per cent. of the area irrigated and is not perceptibly increasing "f—That refers to the salt landon the Khari Cut Canal.
- 17. Q. On the Hathmati you say there is no sait laud?—No laud has turned sait under the Hathmati.
- 18. Q. There is a proposal for a large storage of water for the Hathmati Canalf-Yes; I have had nothing to do with that project.
- 19. Q. There has also been o project for the Bokh reservoirf Yes.
- 20. Q. The Bhujwa channel was an alternative scheme?

  Yes; at first it was proposed to make a considerably higher dam across the Bokh and make the reservoir much bigger; subsequently it was proposed to divert the surplus water of the Hathmati through this Bhujwa channel into the Khari of a small cost. It has cost about Rs. 7,000.
- 21. Q. How much water do you think will be got in that way?—In normal years we expect the discharge to be 60 cubic first throughout the kharif season.
- 22. Q. You trought forward this scheme for the Bokh in addition to the other schemes?—Yes.
- 23. Q. Your seheme provides for a 85 feet high dam across the river?—Yes.
  - 21. Q. You cut down the former project ? Yes.
- 25. Q. Because less water was available?—In the former project it was proposed to feed the reservoir from the Hathmati Canal, we have now taken water from the Hathmati Canal through the Bhujwa Channel.
- 26. Q. On what du you hase your calculation of slorage, on the mean or the maximum rainfall f. Upon the mean rainfall of the year and we take n certain run off. In this ese the rou off is ith of the salnfall.
- 27. Q. (Mr. Higham)-You mean average rainfall?-
- 28. Q. (The President)—Suppose you went upon the maximum minfall, would you get too much water?—That deprads upon the intensity of rainfall; you might get 10 inches nf rain in one day and get too much water, or might have 10 inches distributed over two days and it might do no harm.
- 29. Q. You think there would be dauger of damage by floods?—No; but it is not worth making a costly scheme on the chante of a rainfall which may only occur once in tru years.
- 30. Q. Have 500 got the Khori project complete?—We have completed the earthwork only. It was sanctimed during the last famine. I nm speaking of the Khari Cut extension.
- 31. Q. You say waters from three sources are stored in the Chandola tank; what are the three sources?—The first source is the catchment of the Chandola tank itself; it comes from a long distance; the second source is too Khari Cut; and the third is the surples water of the Hathmati.
- 32. Q. Is the Chandels tank large enough to hold this water? It has been increased tils former capacity was about 60 millions cubic feet, it has now been increased to Blutt 100 millions cubic fect.
- 33. Q. Is that sufficient?—Yes, as a distributing re-error; for a hig system it is too small a reservolr; it will refill from time to time throughout the kbarif season and the water could be distributed as required.
- 3t. Q. Roughly speaking what is your estimate for there extensions?—If carried out as a famine work the expenditure would be a lakh-and-a-half of rupee. Normally the expenditure should not be more than a lakh of rances.
- 25. Q. Including masonry works?—No, not masonry; the masonry works and distributories will contained two or two-auto-abeli lable more.
- no Q Yen say here "tarks in the Ahmsdabad District are meetly sepplied with scater from their own catchments." Did yen get funds to repair the cluices or clear out eilt from any of these tarks?—Yes.

- St. Q. How much did you get !- About Ba. 10,000 a Mr Part. year during the last nine or ten years.
- SS. Q. That does not go very tar?—No; and even that was not spent; the budget is sanctioned in the month of June, and in June the time for repairing the tanks is past and gone; the proper time to repairing the tanks is part and gone; the proper time to repair these tanks is from April to June. We should get permission to start works in anticipation of the budget sanction.
- 39. Q. If it could be arranged to get permission for the Poblic Works Department to start works in autheipation of the bodget grant it would be possible to spend a larger amount?—Yes.
- 40. Q. (Mr. Hoham)—The budget is not sanctioned fill Juno?—Not generally; another cause of the lapse of funds is that a aufficient number of plans and estimates ore not kept ready. I think it would be desirable to have a large number of plans and estimates ready on hand.
- 41. Q. I suppose you have not got establishments to enable you to do that?—It would not be difficult to provide for establishments if it was once taken in hand seriously. for establishments if it was once taken in hand seriously. Then, a great deal of time is lost in ascertaining if the people are willing to pay the 10 per cent rontribution. The general impression is tast according to Government orders the contribution ought to be taken from the people before any tank is taken in hand. Government have left it to the discretion of the Collector to remit this 10 per cent, contribution; still, as a matter of fact, a great deal of time is lost in making inquiries whether the people of a particular village are willing to contribute. Taking all these things into consideration it is not possible to expend the full grant. the full grant.
- [Mr. Muir-Mackenzic.—The question of abolishing the contribution is under consideration.]
- 42. Q. (The President)—How much of the Rs. 10,000, do you spend?—About half. I have got the oxact figures of the last seven or eight years which show that we have been able to spend about Rs. 30,000 on these tanks.
- 43. Q. (Mr. Ibbetson)—In paragraph 80 you say that in ten years there has been an expenditure of Rs. 25,618 ou tauks P—Yes.
- 41. Q. Then f suppose you have repaired a great many of the tanks? Not a great many.
- 45. Q. What was the largest amount spent in any one year?—I cannot say.
- 46. Q. It is proposed to spend some five laklis of rupces in 30 years? Yea; on all the tanks.
- 47. Q. Are there ony tanks which are not in n rninous condition! Very few of thom are in a ruinous state and past repair.
- 49. Q (The President)-The figures in your memorandom are a rough forecast? -Yes, we may have taken so many rupees per tank.
- 49. Q By repairing the tanks will the area of irrigation under them be much increased f-I do not think so; it will be made more secore.
- 50. Q. A number of old tanks will be supplied under the Khari system. The idea is to use up all the water?—Yes.
- 51. Q. You say none will be wasted?—In big floods some of it will be was'ed.
- 52. Q. I notice that for the Salarmeti Canal a cut of 40 feet is proposed?-First it Is 40 feet; and thou it is about 20 feet.
- 53. Q The deep cutting is only in the first mile?-Yes. 51. Q. You propose to build n weir neroes the Sabar-nati?—Yes.
- 65. Q. Would you have a permanent bar aeross the ver?-Yes.
- 56. Q How high !- It will be five feet bigher than the cummer water level. The project was prepared in 1875, but
- 57. Q Supposing von made it ten feet would it be dangerous?—Yes; because the foundation is sandy; there is no rock; we have got clay below the sand.
- 58. Q. West volume of water will be held up by the weir?-I do not know,
- 59. Q. Hare you had levels taken?—The fall in the river is not more than a foot and a half per mile and the beight is not more than als or seven feet; we cannot store much water. The flow in the river is considerable.
- CO. Q Would it be worth storing water if you can up gates? That may be done in the cold weather if y put revolving gute.

5 Dec 01

Mr. Tara-5 Dec. 01.

- Mr. Tara- 61. Q. Hos that been thought of P-I have been think-puravala. ing of it; I wes not called apon to submit o written report on this point.
  - 62. Q. What stogo has that project reached?-It is hofore Government.
  - 63. Q. You say the cost will be about Rs. 18,60,000 ?-Yes.
  - 64. Q. You say 23 per cent. for establishment charges ?— That is not the netual establishment required; but a certain percentage fixed by Government; it includes establishment of oll kinds. It is simply a nominal figure.
  - 65. Q. How far does the canol from the Sabarmati go ?-It is 27 miles long ond goes as far as Dholka.
  - 66. Q Does it supply any tonks?-Yes; the whole place is full of taoks.
  - 67. Q. To go back to the question of irrigation tanks, you say they irrigate 26,600 cores; where did you get these figures from?—They are the result of inquiries made by the Poblic Works Department in 1894. A subordinate was sent round to the villages and he got the figures from the village books.
  - 68. Q. Your reply to question No. 8 relates to water logging in the Viramgam Inluka; have you heard any complaints against the draius made there?—No.
  - 63. Q. No complaints in the dry season? Only one drain was made before the fomine and no objection was made. In the first three or four years a good deel of waste land was taken up by the people; then in 1894 a big flood came from the Gaikwar's territory and did a let of damage; the damage was enhanced by the construction of the Viramgam Mehsona Railway which blocked up the water; the consequence was that o large area was relinquished.
  - 70. Q. (Mr. Ibbetson) Was the drain large enough ?-No; not for heavy floods, we have lately mode a second drain which is much higger than the first; it is supposed to carry all the water coming from the Kadi side.
  - 71. Q. (The President)—Have you heard complaints about the silting up of rivers ?—I have.
  - 72. Q. Have you examined the Sobarmati river?-I hove; the silting is going on very slowly, so slightly that it cannot be noticed in a short period.
  - 73. (Mr. Higham) You say you have on alletment of Rs. 10,000 every year for village tanks ? Yes.
  - 74. Q. You don't spend it because you don't get orders in time ?-- Yes.
  - 75. Q. Do you incur no expenses until you receive orders in June or July; you draw your own pay?—Yes; works commenced during the previous year are kept in progress without waiting for the budget, but I cannot atart new works without special permission.
  - 76. Q. Do you ever get special permission?—I tried once when I was in charge of the Serat District, bot got no reply before I left.
  - 77. Q. When you got Budget orders you cannot go to work because the tanks are full of water?—Because the rainy season has commoneed and the tanks are full of water; they are full of water more or less during the culd season and we connot commence work until perhaps January or February and we have got only two mouths to do the work in.
    - 78. Q. You have also to work up your estimates ?-Yes.
  - 79. Q. How long does this take?-It does not take long; it depends upon the size of the tank; o sub-overseer makes the survey.
  - 80. Q. What sort of survey?-Ho has to take levels ond find the catchment area.
  - 81. Q. Why has he to find the catchment area if it is only a question of diggiog out the tank ?-These tunks me not merely dug out.
  - 82. Q. What is done?-Irrigetion tanks do not require deepeuing as a rule, we have to repair the bund and we try to raise the full supply level if possible.
  - 83. Q. By roising the bund?-Yes. We simply take a longitudinal section of the bund, measure the catchment oren of the tank, and take cross sections of the bund.
  - 84. Q. Why do you want the catchioent area?— Beconse it is laid down by the rules for preparing plans and estimates of these tanks. For tanks which are not taken in hand for a large number of years it is necessary to moke complete plans showing how tho tank will be fed from

- the catchment. A large number of these tanks have not hoen tonehed for years.
- 85. Q. How many tanks have you got P-1,286 tanks, large and small.
- 86. Q. If each tank is overhauled once in 20 years you must clear about 60 tanks o year?—Yes; but it is now proposed to give up about 400 small tonks.
- 87. Q. Yon will then have only 800 It will not take long to survey them?—Out of these a good many larger ones have been repaired in past years. During the last famine we repaired 32 tanks.
- 88. Q. Not more than that ? What did you do as relief work?—The people were employed on village tanks, railways, and roads.
- 89. Q. Why did you not put thom on your tanks ?-Because we had to select localities for relief purposes; we secons we had to select localities for relief purposes; we were not free to start works wherever we liked; the tooks were not always in the right places and the number of works in hand at one time was limited by Government orders. They would not let us do more than about 20 or 25 works ot the same time.
- 90. Q. You have only 800 tanks which want repairs; if you cleared thom in 20 years, that would be 40 tanks a year ?-Yes.
- 91. Q.- That would not require a large establishment?-No.
- 92. Q. Have you a list of these tanks !- Yes; it was propered by the Public Works Department in 1894; previous to that we had no regolar lists.
- previous to that we had no regoin lists.

  03. Q. Are you taking them up for repair in rotation?—No; before the tanks are surveyed loquiries are made whether the villagers are willing to pay their 10 per ceat contribution. The villagers apply to the Collector; the Collector writes to the Pablic Works Department, and the Public Works Department inquire of the Collector whether the villagers are willing to pay the contribution. In some places the villagers decline to pay; in other places they are willing to contribute, and then the places are prepared. prepared.
- 94. Q. Hawlong does it take to get a reply from the villagors ?- In some cases it takes months.
- 95. Q. How long does it take to survey the tanks ?-Thot depends upon the establishment and how the matter is taken up.
- 96. Q. With regard to the Sabaranti Canol you have expressed an opinion that it ought to pay 5 or 6 per cent. Yes.
- 97. Q. What area do you propose to irrigate?-About 32,000 acres.
- 98. Q. Mr. Beale estimates that the roturn will be only 1 per cent. He reduces the area very much? - That is a matter of opinion. In the first place Mr. Benle has based his estimate oo the total culturable area being 75,000 ocres; I fied that the outurable area will be a lakh of oeres,
- 99. Q. The talukdari records show 59,000 acres of rice; you don't accept that lignic?—Nn; I found out the total area from the Surroy Sittlement Report, I think we shall got 30,000 acres of rice onnually.
- 100. Q. If you have to stort relief works could you put relief labour on the big out ?-Yes.
- 101. Q Are you ready to start; is it lined out ?but it would not take long to line out a portion of the emind; if I recoive instructions to commence the survey to-day I could start work within a month.
  - 102. Q. You could employ may amount of labour ?-Yes.
- 103. Q. What is the length of the canol?-The main canal is 27 miles long.
- 101. Q. You say the rivers raise their beds?-Very slowly.
  - 105. Q. What have you got to go upon ?-Only hearsny.
  - 106. Q. You have never made measurements? Never.
- 107. Q. (Mr. Muir-Mackenzie) -I sit n fact that the bed of the Sabarmoti is rising?—Near Dholka silt is forming here and there, but I cannot say that the bed of the Sabarmati is rising perceptibly.
- 108. Q. People say you can ford it now at Shohibag at a time of year when io formor days you had to cross it hy forry?—I thick people say that io formor years it was impossible to furd the river near Shahibag in February, during the last eight years it has been quite possible to do so.

- I think this impression has been caused by the scanty rainfall of secont years.
- 100. Q. (Me. Hipkort)-Is the Nat in your district? - Y cs.
- 110. Q. What is it? It is a large shallow lake.
- 111. Q. Has it brackish or fresh water !- It is su the mouth of January; and then it becomes brackish -It is sweet till
- 112. Q. Does the water lio there all the year round ?-Yes, more or less.
- 113. Q. htnre you any idea of draining it?-No.
- 114. Q. Could you take the water anywhere else?—It is a difficult que tion to answer without a survey.
- 115. Q. What is the size of the lake?-About 20 square
  - 116. Q. Haw deep?-About five or six feet.
- 117. Q. (The President)-Is the water above the level of the seal-1 could not say; I think it must be a little higher than the sea.
- 118. Q. It is between the Rann of Cutch and the Bay of Cambay ?-Yes.
- 119. Q. When you have no rainfall does it contract?-
  - 120. Q. Does it depend upon rainfall?-Yes.
- 121. Q. Have you any idea of the feeding of these tanks from rivers?—Generally the tanks cannot be fed from rivers; it is only possible in the case of the Khari river. In the Matar Talaka it is possible to feed the tanks from the river by making cuts.
- 122. Q. Has that been tried?-I have made trinis to that effect, it is only n matter of money, it is quite feasible.
- 123. Q. Is there any idea of making these cuts in case you want to employ relief labour f—1 have started one of these tanks in Kalra this year for famine labour.
- 12 L Q. Is relief lahour going on now?—Yes; the tank is under the Kaira Engineer.
- 125. Q. What are you going to do in Ahmsdahad in case of france?—We have got two or three dmins to make; and the Bolh reservoir dum, some railway work and the Sabarmati Canal.
- 126. Q. Where is your programmof liare you got it here?—We have got it ready in print, but I haven't got a copr here.
- 127. Q. Has it been approved by the Local Government?

  —It was approved by the Commissioner and sent to the Local Government and approved by them.
- 123. Q. Yon spenk of the leakage of the Hathmati Caral?—We have diminished a great deal of it by improving the slope of the first ten miles of the canal.
- 129. Q. Area irrigated by that canal cannot be extended? It is not possible to extend it, because the soil is not suit able for rice; the maximum rabl cultivation is about 3,500
- 130. Q. The soil is not suitable for rice ?-Not at all : but the canal will not pay unless you grow rice. No canal in Gnjarat will be of any good except for rice.
- 131. Q. Supposing the canal was not there, what would the rayats growf-Wheat, lapri and juari.
- 132. Q. They make more out of rice?-Yes, but it is rather expensive to Government, because we are obliged to give them three times the water that is required for rice elsewhere. During the measoon the only crop requiring water is rice
- 183. Q. You cannot store mater?-No, we have no reser-Trir.
- 184. Q. Could you not pass the water down for other trigation i-I made proposals to stop rice cultivation on the Hathmati Canal altogether; it was so wasselol; I proposed to give the water to the Khari Cut, where it would ighte three times the area it does here; but nothing came of that proposal.
- 135. Q. When did you make the proposal?-Some years ne2
- 150, Q. It is vill urder consideration?-I do not know.
- 137. Q. D.es rice do my harm on the Hathmatië-No; but we are not getting the same broudt from the water that we would live.
- 185. Q. (Mr. Illetion)—If you have the water, could you not extern rabi cultivation on the Hathmati Canal?

- No, because the sail is so randy; it takes a lot of water; Mr. Tura-it is not possible to extend rabi cultivation; you can get purvate 5,000 acres at the most.
- 130. Q. The people don't want water for rabi: They take it to a small extent; only people who have no wells are using canal mater.
- 140. Q. Ropers 5,33,900 which you mentioned is to be spent on putting the tanks into good order and it would not that amount whether it is done non or spread over 20 years F -- Yes.
- 141. Q. They have all been mented of late years?-No; only a small number of them
- 142. Q. Would one-third of the annual revenue be anfileeient to keep them in good order?-It would be more than sofficient.
- 143. Q. What would be eatherent?-About one-fifth of the rareone.
- 141 Q. (Mr. Muir-Mackenzie)—Are there no orders of Government that the tanks should not be repaired without special sanction, if the cost of repairs exceeds ten times the revenue !- Yes ; there are orders to that effect.
- 145. Q. (Mr. Ibbetton)—And where it is anticipated that the cost of repairing is not more than ten times the resence?—Such cases would be ferr.
- 146. Q. Thee tanks have not been repaired ?-Only a few of the more important ones have been repaired.
- 147. Q. The Hathmati Canal is credited with a water rate of so many rapecs an nero?—Yes, subject to the reduction of the water rate fixed at the lost revision of settlement.
- 149. Q. On the Khari Cut also is there a fixed water rate?

   Yes, there is a canal rate of Ra. 7 per aere, subject to the deduction on account of mater revenue assessed by the Herenne Department.
- 149. Q. Do you think this credit represents the full value of water?—I think the rates now charged are very fair: Rs. 7 on the Khari Cat and Rs. 3 on the Hathmati Canni with deductions of water rato which have been fixed by the Survey Department.
- 150. Q. Rupces 7 is the canal water rate?-Yes; but we do not take credit for that.
- 151. Q. (Mr. Migham)—How is that ?—I do not know they are shown; we simply take credit for sums realized; the whole of the rates are not credited to us.
- 132. Q. (Mr. Ibbetson)—Suppose the water rate is fixed at Rs. 2 per nere; then a man urrigating rice has to pay Rs. 2 in his consolidated assessment and Rs. 5 as canal dues; what are you going to credit to the canal, Rs. 5 or -Only Rs. 5.
  - 153 Q Water rate is not credited by you ?-No.
- 151 Q. Doo't you think you have a fair claim to it f-No; we are supposed to supply less water from our canal to fields on which the Survey Department has fixed the rate for water at Rs. 2, because the field bus got certain water advantages already.
- 165. Q. This water rate means a rate for rain?-For rain as well as tank.
- Tain as well as tank.

  156. Q. (Mr. Ibbetson)—Why is the onter rate on the Khuri Cat double that on the Hatbmati Canal?—Because the soil is rough richer and more soltable for rice. The Hathmati soil is not suitable for rice, it is very sandy and not so rich as the Kharl soil.
- 157. Q. Out of the 1,300 tanks most are small; are there any large ones !- There are a number of large ones nies.
- 158. Q. You do not think there is much room for making new tanks; have surveys been made?—No, I do not think we could find many sites for new tanks.
- 159. Q. You do not think it is worth while making a arrey f-I do not think so except in certain parts.
- 160. Q. You would sorrey certain parts?-Yes, but nothing extensive.
- 161. Q You say that Local funds have been spent on irrigation tanks?—You.
- 162 Q. Supposing the Local Boards had the water revenue swigned to them, do you think they could be needly employed in repairing the small retarks?—I think it would be difficult for them to manage them.
- 163. Q. Why?-Beause they have got limited establishment.
- 161. Q. If money is given them they could train men properly i-That is a question which I have not thought

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Mr. Tarapurrala.

- 165. Q. (Mr. Rajaratna Mdlr.) Is the oa rule in the Bembay Presidency that land within n certain distance of a canal constructed by Government is liable to pay water rate, 6 Dec 01. whether irrigated or not ?—Yes.
  - 166. Q. What is the distance?-Two hundred yards.
  - 167. Q. For percolation?—nud whether irrigated or net?—Yes; provided a wet crop is grown.
  - 168. Q. On the Hathmati Canal how much of the area commanded comes within the prescribed distance of 200 yards?—Abent 300 acres.
  - 169. Q. Does the rule refer to branch channels also?-Yes.
  - 170. Q. Mr. Bealo classifier tanks as first class and second lass. What are first class works?—They are hig tanks; I don't know the distinction.
  - 171. Q. How many tanks were repaired during the famine?—Thirty-two.
  - 172. Q. What amount was spent on them ?-About ten lakhs.
    - 173. Q. Rupces 10,00,000 on 32 tanksf-Yes.
  - 174. Q. Want would be the normal value of the work done?-About 6 laklis.
    - 175. Q. Were they hig tanks ?-Yes.
  - 176. Q. What was the revenue they paid before they were repaired?—I could not say.
  - 177. Q. What probable increase do you expect?-A fair increase.
  - 178. Q. Can you say from personal knowledge that in their present condition these tanks are capable of irrigating the full area? - In fairly good years they are.
  - 179. Q. You say that 23 per cent. for establishment charges is n henvy item ?-Yes.
  - 180. Q. What is the actual cost taking the whole district or division?-I could not say.
  - 181. Q. You must have some idea. Would it be 20 per cent.?—Perhaps not more than 12 per cent. for large works.
  - 182 Q I am not referring to any particular works ; taking an average of three or four years would a 20 per cent. debit he very much higher than your netual charges?—Twentythree per cent. is debited for large works.
  - 183. Q. What is debited for small works?—There is no debit made; notnal charges are debited. On the Sabarmati project we would be debited with 23 per cent.
  - 184. Q. There are some debits under the heading of collection charges ?- Yes.
  - 185. Q. Will you kindly explain what they are? statement is prepared by us of the amounts to be realized from different landholders for water supplied from nur canals. This statement is sent to the Collector and the Collector realizes. The village officers are paid 5 per cent. of the actual realization for their trouble; this is charged to the works.
  - 186. Q. For what works?-Only for those fer which capital accounts nro kept.
  - 187. Q. In this statement collection charges and gross revenue are given; you will find the charges are mostly 10 per cent. 1-On the Hathmeti and other capital account works they clarge o per cent.; I verified that yesterday; we submit a statement to the Collector when our nesessment work is finished; the whols work of collection is managed by the Secretariat and the Rovenuo Department.
  - 188. Q. What is the cost of the establishment?-It comes to very little.
  - 189. Q. You have a separate measuring establishment to maintain?—It is oot a separate establishment; only additional surveyers are employed.
  - 190. Q. Once the land is irrigated is it not classed as wet permanently?-No; you are not bound to pay water rate on the same land always.
  - 191. Q. Do you receive revenue both from tanks and canals P-I simply look after the canals; all tank revenue is collected by the Revenue Department; I have got nothing to de with that.
  - 192. Q. You have no major tanks under the Public Works Department?—No.
  - 193. Q. In reply to printed question 15, you say "irrigation is supplemented by well water in case of late commencement of rain and no supply in the reservoir

- for rice seedlings." In such cases do you make any abatement in your water rate ?-Yos.
- 194. Q. Do you remit the whole water rate?—Yos; if the whole crop is destroyed we take nothing.
- 195. Q. Supposing a crop is matured on the canal supply supplemented by well irrigation?—We charge half rates.
- 196. Q. In your written reply, you give the following

				Aores.
Hathmati Canal	•	•	•	8,000
Khari Cut .	٠	•	•	3,000
Khari sluices				8,800
Tanks				26,600

Do you think those areas will be protected in times of drought ?-Unless we have storage on the Hathmati Canal the areas on the cansis could not be protected.

- 197. Q. In times of drought could you protect the areas mentioned?—We could not protect them at all. Last year and this year there was not a single acre protected.
- 198. Q. When the storago works are completed will the Hathmati Canal be able to protect that area?—I, doubt it very much. In a year of complete drought like 1899 I do not know whether the bigger reservoir on the Hathmati Canal would give any appreciable protection because the reservoir would very probably run dry.
- 199. Q. (Mr. Muir-Mackenzie)—Regarding rice onliivation in this district that does not receive water from the tanks do you support the Commissioner's statement that it talls in 2 or 3 years out of 5?—Yes.
- 200. Q. D. you think that there are very few sites for tanks left?—Yes, in the rice country.
- 201. Q. Is it worth while baving surveys?-It may be worth while having a few surveys made.
- 203. Q. Saline edlorescence is caused in your experience by over irrigation?-No.
- 203. Q. And water-logging?—On the Khari about 10 per cent. of the land has suffered budly on account of waterlogging and salt; but that system has been going on for the last 100 or 200 years.
- 201. Q. Has water-logging been increased in the country of late years?—Yes, considerably in Viramgam and Sanand on account of the construction of a drain of late years by the Gaikwar. The first serious complaints of water logging legan after the great flood of 1894.
- 205. Q. It was caused by that flood?—Yes; the flood was intensified by the Kadi Division drains made in the Gaikwar's territory.
- 200. Q. You spent 10 lakbs in the famine on repairs of irrigation tanks  $\tilde{r} \rightarrow Yes$ .
- 207. Q. Was it all spont on repairs ?-Only to a small extent on repairs, mostly on improvements, such as deepening.
- 203. Q. The 10 lakhs were spent simply on account of famine ?-Yes.
- 209. Q. Had it not been for famine on these 32 tanks we should not have spent more than Rs. 50,000 ?-No.
- 210. Q. If you had had more money to spend you could have repaired more tanks ?-It was not practicable.
- 211. Q. Why not?—We were restricted as to the number of works by the instructions of Government; we might have done n larger number of tanks in 1899 but we were restricted.
- 212. Q. Due to instructions as to concentration ?-Yes; we could not employ 100 people on these tanks; we were obliged to employ a large number - 5,000 or 10,000 -- in each place.
- 213. Q. The charge for percolation is very high on the Hathmati Canal ?-Generally.
- 214. Q. I never heard of such a high charge anywhere else?—It is in necordance with the Act. The Canal Act lays that down.

I.—Letter from Superintending Engineer, Northern Division, to the Chief Steretary to Bombay Government, Famine Department,—No. 6114, dated 25th November 1901.

In reference to Government Resalution No. 2275 of 26th October 1903 and intimation that I am nominated as a witness before the Irregation Commission, I have the locuour to state that the memorandum accompanying the Government Resolution and the detail questions from forerment Resolution and the detail questions in con-tinuation of it appear to require replies especially from each district and do not admit of generalization for the whole Division. I therefore refinin from attempting details and confine myself to giving my general views on Gujarát in light of the memorandum and brief answers on Guyrat in light of the menioral and and priof answers to the second paper. My experience of Gojarat goes back to 1859, when I was an Assistant Engineer on the Femhay, Baroda and Central India Raiway, and with the exception of about two years when I was in the Decean, my service has been enthely in Gujarat and Kathiaway. I do not be climate to at once say that and käthikwär. I do not hesitate to at once say that Gnjaråt is not a district subject to famine, and in my opinion is not in want of famine projective works. It is essentially a very fertile land, which in normal years—and these are the rule and not the exception—yields a good return to its agriculturists in cope they can raise without aid of irrigation; but well-irrigation is practised more or less all over it, as water is generally within workable death, and profits from the last of wratified to a cartain event. and profits from tanks its also practised to a certain extent when the tanks lend themselves to it, while the only canal systems we have in the Division (the Hathanti, Khari Cut and Klari Sluices in Ahmadabad) are appreciated and and Klari Sluices in Ahmadabad) are appreciated and patronized for rice cultivation, but the country is in no way dependent on their aids to cultivation, its staple crops being grains and cotton, both of which it can grow without irrigation. By these remarks I do not intend to in any way deprecate irrigation, but make them to illustrate my opinion of the natural capabilities of Gujarát country. The geological features of the country under report may be divided into a few main heids. That from Surat Collectorate in the south to the north of the Broach Collectorate where it meets the Gackwar territory is all more or less rich black soil growing grain and cotton whom tany irrigation; the cultivators preferring these ordinary crops and not going in for irrigation except in a small, way and special cases in abnormal years. Water in found almost everywhere in wells fed by percolation of enriface water in most cross but from eprings or underground streams in others, the strata of the sub-soil being salme in many places and expecially towards the frings of the country along the especially towards the fringe of the country along the caboard where deepeoing wells leads to getting salt water. A large number of rivers run through the Surat District, A large number of rivers run through the Surat District, but are subject to tidal influence from 10 to 20 miles up. In Brosch the rivers are few and small if you exclude the Nerbudda. North of the Mhye River you enter Kaura and here the Hack roll is lost, its place being taken by a bind of learn which extends up north more or less inixed with rain and forms the general features of the soil up through Knim and Ahmadabad, and so far as that goes on up to Piliappar getting u ere sardy the further north it advances. The western talinkas of the Panch Mahdis come under the same enterprise and its only averaging is some of the waters and estegory and its out ranch Sansar come under the same category and its out exception is some of the western and north-western talukas of Ahmalabad, Virangám and Sánand, with parts of Phundhuka and Pholku, where there is a certain proportion of black soil that grows cotton. The country is generally well served with a nanober of rivers country is generally well served with a number of rivers running from cert to west through it which have a more of less perunnial flow in normal years, and no doubt largely supply it a wella of the distret which ner goal and pleutiful, were no it doubt from 25 to 100 feet. The Eastern Parel Marshitz a different nature of country altogether, leage July and brasily timbered with the sallays, more or less thack soil and fertile near rule, but with a goal deal of stony where lard interpreted. To do water is obtained to a rule in wells of shallow depth sinking desperanting recklingation in his the Division may be summed up shortly. Of carakt their are none excepting the Hutbursti and Khari staten in Almalatad, which care but a small portion of its Cellecterate and are follows from a connection part of view, it high in negret years they encourage, the growner relew, it ough in nerval years they encourage the groung of the rice, and usually some find acres of the are grown with their sile. The vistems depind for the reapply on the listing it and librari library, and in bod years they run so it, and in the last three years they have practically and the last three years they have practically folied alt gebien.

Firsts - When these about of their nater being used with little or no life, integation in small patches is dene from

them; Ahmalabad, Kairs and Sarat being best supplied with them and Brooch and Pauch Mahala the worst.

Bunds.—In the flat low-lying plains of Virangam and some other places towards the "Null" and Gulf of Couley the cultivators have introduced a system of throwing up long low hunds across slight dispressions in the fields and thus holding up large areas of water which just suffice to give them rice crops below the bunds, while wheat is grown on the damp land above the bunds as the water time off it.

Wells - Gujarat as n rule is plentifully supplied with wells, the largest number heing in Ahnadabul and Kalra and the least in Brouch. In the least seed of Guiards the wells generally run deep with good supply feeding from percolation through the sandy strate below, but in the more sandy portions the supply seems to be nearer the surface though not sombuniant and in some tracts getting leastly breakly bend and exactable for a decourage to getting the surface though not sombuniant and in some tracts getting mere sandy portions the supply seems to be mearer the surface though not somban iant and in some tracts getting bracki-h and solit, especially if you deepen the wells a little. In the black soll cenuity the wells are generally supplied from drainage of surface water which is held in the black soil and slowly works down to the weils and feeds them. Nearly all the best wells are situated close to tanks or water re-ceivers of some sort. The lower water in the black soil districts is very often salt, and hence you have to depend on the percolated surface water thungh there are cases where deep wells git a sweet supply from springs or other undergro, all supply. I hope to soon have a map ready showing the general water features of wells in all districts. It may generally be said that, excluding garden produce and a little sugarcane, rice is the one crop grown by means of irrigation, and as Gajarát rice is of fine quality, it is a crop that pays well, and wherever water is available cultivators have taken advantage of it to produce rice. There ore also certain tracts of country in both Ahoadabid and Kaira which are known on "the lands," as they lend themselves to its cultivation by holding up sufficient water within little bunds from normal rainfall to produce rice with but little sid, if any, from irrigation. Since the cannals in Ahmadabid were made the people have quickly taken advantage of them to go in for rice cultivation in preference to dry crops, and it is a question how far the production of the moto valuable crops may be taken as a benefit to the district generally and a protection squinst bad years, an it certainly should be, if the people laid up the profits of good years to tide over the losses of had; but there appears great doubt whether they do this as was so strongly demonstrated to the late years of famine, when the profits of good years to the over the losses of that; but there appears great doubt whether they do this as were strongly demonstrated in the late years of faming, when the presumed rich cultivators of Gujarát so quickly fell into a condition of want and distress which their habits of life and food onabled them so bally to withstand. How far irrigation can enrich the country generally and act as a famine protective is difficult to say, but undoubte ily the richer the produce of the country the larger resources there richer the produce of the country the larger resources there should be in it, and encouragement of brightion ahould be useful to this end. Admitting the fact, the question to be considered is how far it can be practicably developed. In Ahmadabid, where there are the existing count systems, we can effect considerable improvements be increasing reservoirs, and the first of these projects is the "Bokh, while, while not costly, will give a considerable increase to the Khari Cunal system, and this in my opinion should be carried out. We then have an entirely new scheme, the Sabirmati Canal, which is now under consideration, and this completes the list for Ahmadabid. In Kaira there are no cann's at all except a length of the Khari system which supplies some Kaira land, but a suggestion has been made to bould the Mhys Elver and thus may be a possible scheme; to brind the Mhys River and thus may been possible scheme; but I have not sufficient information at present before me to give any opinion in it. In Surat there is the old Tapta project, but it generally supplies the black soil country and has not with opposition from Rivenue Officers.

has not with epposition from Moveme Unicers.

Timels.—There are no creatin number of these taken up in the fewice, if which the lest certainly should be completely, and some proposal for the Mandel Taluka of Surat might be worked up. The Markila tank in Panel. Mahdis he so fix advance i that it would be a filly in my opinion not to complete it. General and more curful attention to all existing infiguities tanks I would advocate, as also sources tracked where the Bindse' existent can be extended and water held up temporarily, as is done in Viringsim. Tanks outer to it in Pack coil do held nater so far as my experience program fairly high black soil hands can be made, if provide curtically, without marking "cores."

Mr. White. 5 Doc. 01.

Wells.—These are the backbone of irrigation in Gujarát and choold in my opinion be encouraged as much as possible after careful enquiry as to how far the different diatricts can bear any increase, taking into consideration their resources for minure itself and nature of soil to stand concentrat irrigating. It will be noticed from memorandum submitted by the Director of Land Records and Agriculture that for Gujarát the areas irrigated by different systems were as below in the two years—I select 1886-1897 as a normal year and 1899-1900 as a famine year:—

				****	1000.
•				1807.	1000.
Proportion of tot	al	irrigat	ion		
Canals				4.9	
Wolle .				76.7	94.7
Tonks				13.3	•4
Other source	S	•	•	5.1	4.9
				300	300
				100	100
					-

# II.—Replies to Questions. A.—General.

- 1. Gujarat generally is a district I have known more or less for the last 30 years as a Railway and Public Works Engineer.
  - 2. See local officers' replies.
  - 8. (1) No.
    - (2) No.
    - (2) 10.
    - (3) Questienable.
    - (4) Yes, in parts of Broach and Surat.
    - (5) Net in normal years.
    - (6) to (8) Revenue officers can best answer.
    - (9) General fortility of the country and case with which ordinary ramtall enables good crops to be produced.
- 4. Will be replied to by Revenne officere.
- 5. Do. de. do.
- 6. No. A desire for irrigation has been expressed by the people of Abmadabad since the famine.

## B.-CANALS OF CONTINCOUS FLOW.

- 7. (1), (2) and (3'.—Probably from 40 to 100 per cent-from one or other of the reasons.
  - 8. (1) Roughly 50 or 75 per cent.
    - (2) Cannot answer.
  - 9. Will be best unswered by local officers.
  - 10. Will be noswered by Revenue nuthorities.
  - 11. Not so far as I knew.

## C .- CANALS OF INTERMITTENT FLOW-

- 12. See Abmadabad Executive Engineer's reply.
- 13. Answer to previous Question 7 will apply to this except in snb-head C, when the value of the cunal is of a negative order, as the collivatore may prepare land in anticipation of getting water which they never receive.
- 14. The supply of water in Gujarát is mostly n demand in September and October, and so long no it does not feel the value of the irrigation is not diminished.
  - 15. Occasionally; under exceptional eironmetances.
  - 16. See answer to Question 8.
  - 17. Do. do.
  - 18. Will be answered by Revenne authorities.
  - 19. See maswer to Question No. 2.
  - 20. Sec Excentive Engineer's reply.
- 21. None.
- 22. No.

## D.-TANKS.

- 23. (1) Generally by their own catchment.
  - (2) By the cultivators themselves in a permitive manner nader their own arrangements.

- (3) Varies considerably according to rainfall and the crops the water is used for, but generally from July to October.
- (4) Vario s from n few acree to some hundreds.
- 24. Differs in different districts. See Surat and Breach Executive Engineer's reply.
  - 25. No remarks.
  - 26. Occasionally and only when essential.
  - 27. Cannot answer eatisfectorily.
  - 28. See local officers' replies.
  - 9. Do. do.
  - 30. Do. do.
  - 31. Revenne officers can best answer.
- 32. Yos, but I regret I cannot at present reply to the final part of the questione.
- 33. Tanks certainly de silt up and mero so in black seil country. I can give no statistics on the point, but tanks from time to time are dug out, the silt being romoved dry in the hot weather and often taken by the villagers for purposes of mnure.

#### E.-WELLS.

- 31. (1) Statements will be sabmitted, but depths vary considerably from 20 to 160 feet or more.
  - (2) Generally from porcolation-
    - (a) Not in an ordinary year.
    - (b) Yes.
  - (3) Differs very greatly, say, from 3 to 15 hundred rapees.
  - (4) Unknown.
  - (5) By bullock " mot."
  - (6) Unknown.
  - (7) Do.
  - 35. Can best be answered by Revenue officers.
  - 36. De. do. de. de.
  - 37. De. do. do. do.
  - 38. (1) No.
    - (2) No.

I am not aware of any special assistance baving been offered by Government, but local officers have given advice and in certain places trial borings have been made hoth by Government and privato individuals: so far as my knowledge goss, horings have shown favourable results in a fow cases, but more generally have failed. I think it would be useful to bere for the purpose of ascertining whether sweet water can be obtained below the saline etrata which exist in a good many pertions of the different Collectorates.

- 39. A question I am not prepared to reply to withent going more closely into it, but generally speaking I should be inclined to encourage the construction of wells.
- 40. Temperary wells are occasionally used in the districts which will admit of their construction, but they are not practicable in very eardy or black soil. They are a very poor protection against drought. I am not propared to answer the last question.
- -P. S.—A point, I eee, I have omitted to notice ie "water-logging." In nearly all the Collectorates of Gejarat damage from water-logging has from time to time heen reported, and in many cases remedial measures have heen carried out, but it is questiouable with what measure of success, as in many cases where beasts accrued on certain tracts injury occurred on others, and the very cultivators who begged for drains to clear water away from their landa have since in some places seked for them to be stopped up, and in the case of some small drains in Broach have themeelves bunded up the drains. The truth is, that we do not yet seem to therengally understand all the effects of altering the water conditions on different classes of soil. In econo places when we bring water on, it seems to spoil the land by raising up cult: in others when the water is drawn away the people complain that the good top surface soil goes with it, and so on. The heavy floode of 1894-95 which drowned large areas of land in Kaira and, I think, also parts of Almadabad made a number of tanks and also wells "brackish," se much so that in some oness irrigation from them was abaudened, the Trag irrigation tank in Kaira heiag nease ia point. I would advocate a careful survey of the results of the drainage as far done before deciding on new proposals.

- 1. Q. (The President)—In your letter to Chief Secretary you say:—" Gojarit is not a district sobject to famine and in my opinion is not in want of famine protective works;" you do not recommend that works like the Sabaranati or the Hathmati Canaly should be put on the list of famine works?—I think they should be treated rather as commercial works rather as commercial works.
- 2. Q. Wruld you means either of them as works to be carried out in famine time as relief works?—I should put the Sabarmati in that extensity.
- S. Q. From a commercial standpoint do the Hathmati and Khari Canals pay their war ?—I do not think so.
- 4. Q. Ther ore emplie of improvement financially f-
- 5. Q. What would you do to improve them f ... Storage is the great requirement of the district which is well served by the river which runs through it.
- by the river which runs through it.

  6. Q. Would you advocate a through hydrographic extract of the country as received extrement, basing 1 da not man for direct irrigation but for storage reservoirs?—I should advocate it in places. In some parts when there are great flat meas it would be quite needless. The conditions of the country are not properly known, we have never sufficiently studied the question. The lest extehnells for storage for the Huthmall and Khari systems are probably in the I'dar State. For the Panch Mahalls the test sites would be in Itaroda where the heads of the rivers lie. There are sites for tanks in our territory, but for small tanks only. A thorough survey of the country is required as no really do not know what is or what is not possible.

  7. O. Mr. Lely thinks that the rivers masing north
- 7. Q. Mr. Lely thinks that the rivers passing north 7. Q. Mr. Lely thinks that the rivers passing north and south of this district are silting up. Have you say personal knowledge of that?—I have visited certain rivers, after a lay-e of a good many years, and have noticed that they are distinctly silting up; the resulting delta foing further out to sea. For instance, all the waters of the lians now slak underground and disappear before they reach the sea. The deltas on the Tapti and the Nerbodda have river so high that cultivation has been started in many of the lebuds. After ten years I went with Mr. Lely to Dholta and found cultivation where there were only said and tunarish before. As far as I can see, the beds have been raised and the channels blocked to a great extent.
  - 8. Q. Have ony levels been taken?-No.
- 9. Q. (Mr Muir-Maclenzie)—Have you heard that 30 years ago there used to be a ferry at Shahibag F-No. I have some idea of having seen n basin there.
- 10. Q. (The President)—We have heard complaints of times done by dumns in water-loyeed tracts. Have you 10. Q. (The President)—We have heard companies of damage done by drawns in water-logged tracts. Have you seen anything of this?—I am open to correction, but from what I have seen, I think that in certain pieces the drains have taken off the water too quickly when in flood and have reduced off portions of the surface. I have seen "cutterings," in places, but I do not think that any extension large taken beach and as eive liarm bas been done-
- 11. Q. Has much damage been done by floods in past verts !—In many floods the Bailways held up water over large areas, and in 1891 great damage was done in Virungia, the whole country being floodel and cattle and sheep drowned. There were complaints that these floods were causing damage to the soil. A great amount of damage has been done in the Almadabad and Kaira Districts by abnormal floods in past years.
- 12. Q. What do you consider the best form of famina relief?—Some kind of earthwork. I should think cuttings like the Sabaromi Canal; digging new touts, improving cld ones, and making new bunds would be better than making reads and milesys.
- 13. Q. Do you advante irrigation by steam pamps?—I think that it is n good this gloer-courage. There is a tendency among well-to-do people to use promps for regular cultivation; certain persons not trying the experiment in the Ahmadalad Platrick and on the Salarmeth.
- 14. Q. Mount capital I suppose? -Yes, and Mr. J. N. Tata of Bombay is having deep borings made in the Eurat Daniel.
- 15. Q. Then there is a tendency for people to try experiments of that sorti-Yes, for some wealthy ones.
- 16 Q Yen see an objection to pumping mater out of the river?—From the Nerhudda I see name. In fact, a theory has been advorced by an Assistant Engineer that the enignar noirinate from the North Ha river would be to pump the mater into the energy of reservoir,
- 17. Q. (Mr. Her) are Yen were speaking about heavy for the gen know what the effect of these has honed

The figures of the loss are given to the Statistical Atlan. Mr. White Enormous damage has been done to crops by heavy feeds in certain years.

5 Pec. 03.

- 16. Q. Was the land rendered unculturable f-In some cases lands were covered with sand, in other places the soil was rendered saity. In places like Kulra it e tanks and wells were rendered brackish and useless for irrigation for
- 10. Q. Do you propose to moke my protective bonds or embunkments!—No. It would require a very large scheme to protect the district by bunds. I do not say for one moment that it is impossible to carry out such a gebenne, but it would be a very large project and has never, to my koow-ledge, been seriously proposed.
- 20. Q. Yoo have certain drainage proposals which will have the effect of bringing a considerable area of land under coltimion?—Yes, but I have no figures for them.
- 21 Q What are your proposals !- I propose to relieve the water-logged aress.
  - 22. Q. Can the water-logged lands be improved P-Yes.
- 23. Q. And improving them will resolt in recenue being paid on them !—I should think ro.
- 21. Q. Will there be an ancrease in cultivation f Yes, the main object of these drains will be to rehere the land and collect the mater. In Virangem there are large tanks which are filled to this way.
- 25. Q. Are there drainage schemes in the femine programme?—Yes. There is still scope for dimlorge in places.
- 26. Q. Complaints are made that in dry years there drains take off the water too fast?—I should imagine that to be the case; they want regulators.
- 27. Q. In o year when the rainfall is below the average the drains will have the effect of taking all the water off ?—
  Probably , it has been difficult to jodge oftent this during the past few years. Some of the drains have only just been made; in dry years perhaps they take away too inneh water; the villagers don't know their requirements.
- 25. Q. With a system of regulators and abandant rainfall 28. Q. With a system of regulators and soundant rainting could not the water be kept on the lands in dry years — Yes. There has been instances of this in Broach where the villagers asked for drains and have now bunded them up. Drains without some kind of regulators are not very neefal; the Executive Engineers have proposed to provide them in some of the drains to the Surat and other Districts.
- 29, Q. With regulators the drains would be useful?
- 30. Q. Are they proposed?-I do not know if definite proposels have been made. The Executive Engineer of Sorat has proposed regulators for his district.
- 31. Q. What about these hands which you describe on flat plains?-The land is flat in Virningam, and the villager that plains?—The land is flat in Virningain, and the villagers throw up a system of long low bonds across what are known as reas; there hold up the water to o depth of 4 or 5 feet and it spreads over o very large orea; they use the water for rice cultivatum below the band, and or the land behind the bund dries they alw wheat and gram. A good deal of cultivation gaes on in this way. There was an outery about it at places and complaints were made that by putting up so many bunds oo water was allowed to run to the rillages below.
- 32. Q. D. you propose that Government should make these bunds?—We should certainly have a survey made; then the question of whether the cultivators or Government then the question of whether the entrators or coverament should make the bunds can be considered. That would be a revenue question. We might have to pay compensa-tion if Government did work of that kind. There are only certain places where the configuration of the country would lend itself to these bunds.
- 33. Q. Un you think anything could be done in the may of constructing distributing having could be done in the way of constructing distributing having not the mouths of the hill arremati—The nully place we really have got sites for such moch is in the Pauch Mohils. There got a man prospecting three now. We can put soull dams across the streams and store up a certain mount of water.
- and store up a certain amount of water.

  3t. Q. Yoo would not Lave a high dam?—I think in some cases that might be done. Something in that way might be done in the Mandvi Taloka of Sunat and Meluca in Ahmeddad. It is east that in the Parel, Mahile there is no hand to give water to; I have been there and found to in a good many locus there is goodscill in the valleys; in good dead of it is covered with states and is called where there would layer the chand off; I have some the same soft of soil in Kathlawar Irought or less editivation.

Mr. White. 5 Dro. 01.

- 35. Q. Have you got records of the rise and fall of the big rivers?—The only records are in the Railway offices. They have records of the big floods but there is no daily gauging.
- 36. Q. When there is a great flood you record its height?—Yes, on the bridges which are sometimes awept away.
- 37. Q. Are not all these rivers crossed by the Railway ?-Yes.
  - 38. Q. In some cases they cross two or three times f-Yes.
- 30. Q. You don't think it possible to arrange with the Railway people to take records daily during the monson season, as is done in the Punjab?—Yes, I think we could do so where there are bridges.
  - 40. Q. In the cold weather it is not so important? -No.
- 41. Q. You could take n minimum gange?-Yes, we do that.
- 42. Q. That is a matter of gauging the discharge; I nm speaking of a gauge registering the height of the river?—Yes, practically, we do that.
- 48. Q. These irrigation works that you have in Gujarat are all classed as uninor works?—Yes, except the Hathmati Canul, they are classed under the heading of "minor" works. The other works in Gujarat are only small tanks which have hitherto not been properly worked up.
- 44. Q. What is the Hathmati classed as ?-A: a productive work.
- 46. Q. You say that the other works are classed as minor works?-Yes.
- 47. Q. Do you always get as much money as you want for improvements?—As a matter of fact these works are only small tanks. Heretofore there is no doubt that the subject has not been properly looked into as there has been no great want felt for them. They were standing for what they were worth. Now we get from the Government of India about a lakh a year, but we spend only half of it, because the grant comes at a time when we cannot utilize it.
- 48. Q. You get a grant of about n lukh of ropees?—Yes, I think so, it is in Mr. Beale's report.
- Mr. Beals.—The amount is two lakhs a year for the wbolo of the Bombay Presidency.
- 49. Q. Is that for first class works, Mr. Beale?—No, for second class irrigation works.
- 50. Q. (To witness)—So far as Gujarát is concerned do you get as much money as you want!—No, we want more money; half a lakh would not do much. During the last famiue we did a great deal and a great number of tanks were repaired in this fumine. Many of them want completing, and for that purpose we want money.
- 51. Q. Do you want a grently increased grant to carry out the works which have been proposed?—I do not think so; many of these tanks are really not in bad order; they only want small improvements.
- 52. Q. Do you depend for your money entirely on the Government of India?—Suall contributions are received from Local Boards for repairs of tanks.
  - 53. Q. Noue of your works are Provincial !-Nono.
  - 54. Q. They are all Imperial ?-Yes.
- 55. Q. Do you know whether it would be advantageous to provincialize these works f-1 have not given sufficient thought to that point.
- 56. Q. You did not want more money, you had as much money placed at your disposal as you could spaud?—As a matter of fact we have not had to do much; there was no outery and we never felt the want of much money; the people were satisfied; no doubt we could have done more if we had got the money in time. It always came too late—when the Executive Eugineer could not do mything. That is now being altered.
- 57. Q. (Mr. Ibbetson)—You say that Gujarat is pleutifully supplied with wells ?—Yes.
- 58. Q. Do you think there is room for increasing the uumber of wolls largely f—I have made some remarks in my statement on the subject. There are a good many wells in Kaira and Ahmadabad, where you have a light alluvial soil, but few in Broach and the Panch Maháls. Wells can be unseen. In Broach there is deep black soil.
- 59. Q. In the latter part there is, I suppose, not much scope for digging wells  ${}^{9}-No.$

- 60. Q. In the other part there is more scope ?—Yes, in the leamy soil there is great scope for the encouragement of irrigation by wells.
- 61. Q. Woald you ondeavour to holp the people by making trial borings?—We do advise them where there are good sites for wells and where they are likely to get good water. We have got a great deal of information coupiled from which we can generally guess where water might be found, but I do not thuck any Engineer could go into the compound here like a diviner and say "there is water here." We have no geological surveys in Gnjarát to help ns. My opinion is that n geological survey should be made.
- 62. Q. What elso?—We should also have a surface survey to see how our water can be conserved. In the abarmati and the Khari, a mass of water goes down to the Gulf; if that could be conserved we would be helping the rivers and the wells. I do not think you could do anything in the way of increasing wells without having more information to an we have at present.
- 63. Q. Supposing n rayat wants to sink n woll, do you think that a trial boring would be useful?—I do not think so unless you bore down about 20 feet; for if you have got surrounding wells the water runs low.
- 64. Q. Then you don't think that a trial boring is worth making in any individual oase?—I think trial borings are necessary where the water is at great depth, but the cost is very heavy.
- 65. Q. Could you give men rough iden of the cost of a trial buring !—1t depends upon the soil; it increases the deeper you go; boring 50 feet is expensive.
- 66. Q. What would it cost?-It costs Rs. 100 to go down
- 67. Q. What would the tools cost ?-Nearly Rs. 1,000.
- 68. Q. If you want to go down 100 feet it would cest Rs. 200?—From Rs. 200 to Rs. 500; and if you want to go down 200 feet it would cost Rs. 500 or Rs. 1,000.
- 69. Q. (Mr. Muir-Mackenzie)—Do you consider the repairing of small tanks would be a good famine relief measure?—Certainly.
- 70. Q. Do you consider such repairs to be the backbone of your relief programme this year?—Yes.
- 71. Q. Do you mean small tanks?-Small and large.
- 72. Q. I understand from Mr. Furdunji that orders are necessary to make plans and estimates?—Mr. Furdunji has been in only one district. When famine appears plans and estimates can be made without waiting for furmalities.
- 73. Q. Is there any chance of repairing all the tanks for the Rs. 5,30,000 which they are estimated to cost?—It would be a big scheme, and we are not prepared with plans.
- 74. Q. If you got ten lakes could you not repair them? If we have to spend ten lakes we should spend it chiefly on schemes connected with water. We intend to extend the number of rice tanks; they will be most beneficial.
- 76. Q. Would you prefer the Chord Railway?—The Railway would come in very woll as relief works We have to start work in the district where the people are worst off and we cannot march them long distances.
- 77. Q. In the localities where the tanks are you will not have to commence relief works !—Not in all.
- 78 Q. Do you think plenty of sites may be found for these rice tanks?—I would not say plenty; there are a good many sites where we might make these tanks, bunding them slightly to hold a certain amount of water, for cultivation.
- 79. Q. Is this only in the Northorn part?—Oh, in several places.
- 80. Q. In Kaira?—Mr. Robertson, I think, says that there are some sites there.
- 81. Q. Would you advocate the system which was suggested by one of the witnesses, namely, that ou the completion of minor tanks they should be entrusted to Local teards?—I nm not prepared to answer that question without a little more consideration. It depends on what staff the Local Boards have. Local Boards ean very well manage small tanks; but they want a working establishment; they must put a man ou the work and hold him responsible fur its proper management.

52. Q. You think Local Boards can do it?-Yes: I think there is nork which the Local Board could do if they have sufficient catablishment. They could in some cates improve and enlarge the tanks. I hold in my hands a letter from the Collector in which he says that it would be letter to hand over small tanks to civil ngeney and that

irrigation tanks should be left to the management of the Mr. White Public Works Department.

S3. Q. In order to get the estimates for these works eleved off quickly you will have in employ an additional establishment?—Yes, certainly. Looking to the amount of distress generally, I think that this is the best way of utilizing mener.

5 Pec. 61.

## EIGHTEENTH DAY.

## Surat, 9th Decr. 1901.

Witnesses Nos. 23 and 24 - Mr. Gular leuwar and Mr. Motinuar Buadway, Landowners, Amed.

Answers to printed questions by the witnesses.

In the talnks of Amod the land is of four different kinds -(1) black, (2) yellow, (3) mixed, i.e., black and yellow, (4)

There are no irrigated fields at present; but if there are satisfactory (complete) means of irrigation the yield from fields will increase by half ne anuch again.

It is necessary that there should be a rainfall of \$5 to 40 inches. The fall should be in light instalments and should be timely to suit the requirements of cultivation. Formerly the district was well wooled and the people were encouraged to plant fruit trees. These who planted the trees were held to be their owners on whatever land the trees might have been planted. But lately Government have, on the one hand, cut down the trees, and on the other, the people hand, cut down the trees, and on the other, the people have censed to plant more trees as they bore no claim over them. Thus there being no clumps of trees which are supposed to attract rain, the rainfall has been decreasing and the present fall is only half of what it was twenty years before.

Even during the south-west rains there is ordinarily a rant of nater felt in some parts. South-west mossoon is the principal monsoon.

Rice, "Brite", segarcine, "Kodra" and all kinds of regetable, as also tobacco, require to be watered by irrigation. Engarcine is planted before toons on and then requires to be watered. It requires water every eighth day in all staroos except the monsoon.

Tobacco and regetable require to be watered every eighth ay. Vegetable has to be watered all the twelve months of

Rice, "Kodra" and "Barto" are planted during the mousoa, and after the close thereof, i.e., in the months of October and Norember, required to be watered every tenth day. dar,

3. The small tanks in black soil hold water in the monsoon-But they either get dry by the time fields require to be watered, or hold a Fisch cotton s:ll little woter. Embankment can be constructed without "chunam" lime with black enrth which is sticky.

If black soil is to be irrigated it is not surprising that want of water-supply should be felt in years of famine. But want of water is left even in ordinary years, for the crops which are raised by irrigation do not require continuous rain, but only a tunely full at the intervals of eight, ten or afteren days. Besides, some crops require to be watered every fourth day, while others require water at the interval of a week. Hence it is not possible ever to get rain suited to the requirements of the different crops. Owing to the irrigularity of the rainfall n difficulty is experienced to watering the crops at deshed intervals. But even in black sell if strangements for water irrigation supply are made, or if the rainfall is normal, or good, the yield would be good. In this soil oning to smaller yield, as commared with If black soil is to be irrigated it is not surprising that

In this soil owing to smaller yield, as compared with other lands, in consequence of deficient rainfall thre would be a difficulty in the matter of revenue collection. But so larges the cultivator or the historiar las any other source of meaner, or has any savings of o'd there arises to difficulty in the collection of revenue, in accordance with the previous of the matter law. sions of the present law.

Owners of Dack toll fields are extremely analous that irrigation works be undertaken at Sinte expenditure, but no additional tax been that not untilevied from them, or their

rights any war prejudicially effected. If this were done the coltivation, as also the State revenue, will be henefited.

d. Government irrigation works,

If earals from Nerbudda be constructed and their water brought into the Dhudhar river near Bojadra, a great hene-fit will accrue to the cultivation of this taluka. Besides, it is necessary to construct big wells and tanks in other places.

6 and 6 not answered.

7. Wells.

Rayats have not obtained takavi from Government with sufficient free hand to enable them to construct "pakkn" wells; and these that have got taknvi have not obtained any concessions.

The best way is for Government to construct wells for the people at its own expense, because Government is the permanent master at the soil. If that were not done it, would be advantageous if, by giring taken to people, wells were constructed with fice concessions. It has particularly to be brought to ootive that Government charges interest at 5 per cent. on taken loans, while deposit of immery in banks get an interest of 3 per cent. Then it is clear that Government charges a much higher interest. It is necessary therefore that the rate of interest should be much lowered; if possible, it is necessary to have wells constructed by remitting a portion of taken loans ond interest and by increasing the present number of instalments as may be necessary to suit the oircumstances of the cultivator.

Owing to famine in 1899-190) and 1900 1901 the water-supply of the taluka line decreased by £0 per cent, nad in the western part of the taluka, aweet water in some of the big wells las become brockish. In this taluka big wells have not completely dried up, but small wells having dried are left without water.

8. Drainage channel.

There is no necessity.

9. Helief works undertaken during the famine.

In none work addernace during the famine.

In none of the tanks that were dug during the famine many are without any water. The reason it it is the scanty rainfall. This is also due to water being largely absorbed by the new day earth in the hed of tanks. Though all the water has been absorbed the heds are not yet well formed. Besides in some places the tanks have not been provided with proper inlets. These tanks being saturated in village sites are used by the people and do not afford facilities for irrigation. In some of the tanks lately deepened water is not available for estitle to drink.

10. Special request to the Commission.

To securial whether artism wells will prove useful in this district, it is accessary that Government should at its own expense make experiments three or four times in each tolula. It is necessary to have experimental farms in three or four villages in each taluka to show how the fertility of the sull is lacensed by irrigation, how different in do of manness can be used, and how to saw different hirds of crops. The people are not possessed of high eart of intelligence to improve the soil unless convinced by tractical example.

Mr. Gelah

9 Dec. 01.

Mr. Gulab Ishmar. 9 Dec. OL

- 1. Q. (The President)—I nodorstand you are n resident of Amod ?—Yes.
  - 2. Q. Do yoo own land thore?-Yos.
  - 3. Q. Did Amed suffer much from the famine ?-Yes.
- 4. Q. Was there much loss of life !- Yes, many people died, ood also numbers of cattle.
- 5. Q. How do you raise your crops ?-By rain water
- 8. Q. What steps do you think desirable to protoct your village ogninst the effects of famino?—Wells to irrigate the land woold be useful. By this means folder for cuttle and grain for the people can be produced.
- 7. Q. Why do you not make wolls?-I am unable to sink wells, no year after year we have had years; and, bosides, if I was to boild a well, the assessment on the laud will be raised.
- 6. Q. Sorely you know that that is not the case. Is that the generally provailing belief? -You, I believe so; the assessment is raised if a well is dag. A water-rate is charged if we irrigate other lands from our own wells also.
- 9. Q. Can you give any instance to show that that has been done?—In Sarban there is a field, io which a well was snnk by the landowner, and, because he irrigated land during the famino, he was oberged a water-rate, and had to water ossessment for that land, besides the dry ossessment he niroady paid.
- 10. Q. (Mr. Muir-Mackenzie)-When was the well dug P-In 1900.
- 11. Q. (Mr. Rajaratna Mdir.) Is that dry land or wet land?—It was not previously assessed at wet rates.
- 12. Q. (Mr. Muir-Mackenzie)-What was the assess ment before the well was snnk?-About Rs. 5 an acro: Rs. 2 more per acro were added.
- 19. Q. (The President)-In which taluka is that ?-In Amod.
- 14. Q. Were it not for this fear of increased assessment would you sink wells?-Yes.
- 15. Q. Woold you do that from your own means or get taken advances?—From taken advances, I think that the period of repayment should be extended, and the interest reduced.
- 16. Q. How long would you like the period to be extended?—To double the present, which is about five years.
- 17. Q. Would the people be content to bave the period extended to ten years !- Yes, each cultivotor should be treated leniently according to his means.
- 18. Q. What is the rate of interest ?-Five per cont.
- 19. Q. How much do you think it should be reduced?-To 2 per cent.
- 20. Q. Do you think, if the time was prolonged to ten years and the interest reduced to 2 per cent., there would be a great extension of wells P-Yes.
- 21. Q. What is the soil like in your villages?-There ore -(1) black, (2) gorat, (3) black cotton ond gorat mixed, (4) salt lands.
- 22. Q. What land would you irrigate onder the well?-
- 23. Q. How much land do you own?-100 acres.
- 24. Q. Do you think, if you had had wells before the famine, you would have been much better off now P-Yes.
- 25. Q. How much would a well irrigate?-It depends upon the capacity of the woter in the well; one well can irrigate four to five neres.
- 26. Q. I suppose you would like to put down several welle?—I would have one well in each number; the holdings are very senttered.
  - 27. Q. Are there any tanks near your villago?-Yes.
- 28. Q. Did the people owning land under them benefit by them doring the famino ?- No, there was no water in tho tanks.
  - 29. Q. Are the tanks in good repoir ?-Yos.
- 30. Q. As regards preporing for another famine, do you think a large extension of wells would be the best thing for the district of Breach?—It would benefit my taluka. I eannot speak for the rest of the district.
- 21. Q. In ordinary years of rainfull, would these wells bs used?—A little, because the rain is irregular. If rnin came in propor time, I would not have to use the wells. Rain does not come now when the grain is coming late car.

- 32. Q. Before 1899, the rain came pretty regularly?-
- 33. Q. Before the famine time, it would have been no use to have wells ?—No.
- 34. Q. (Mr. Ibbetson) . If you were going to make wells, and borrowed money from a sowear, what interest wou you pay !—It doponds upon the man who takes the lean.
- 85. Q. In the ease of a substantial man like yourself?-From three to six per cent.
- 36. Q. What would a small man have to pay ?-Nioc to twelve per ceat.
- 37. Q. Have you over borrowed money at 3 per cent? -Yes.
- 38. Q. (Mr. Muir-Mackenzie)-What for ?-For marriage expenses.
- 39. Q. (Mr. Rajaratna Mdlr.)—When do yon return the money?—Whenever I can.
- 40. Q. (Mr. Ibbetson)—What did you mean exactly whon you spoke just now of treating a man leniently according to his means?—Giving a poor man in some cases takavi free of interest.
- 41. Q. Are there many disused wells in your parts?—Not many; there are only about 200 to 300 wells in the whole taluka.
- 43. Q. (Mr. Rajaratna Mdlr.)—Do yoo know that Government borrows monoy at Bi per cont. P—Yes.
- 43. Q. Then, how do you expect them to inke 2 per ecot. ? -The land belongs to Government, and if cultivators are benefited, it would be to the interest of Government.
  - 44. Q. How ?-All the land belongs to Government.
- 45. Q. How will Government be benefited?—If the people are solvent, the Government assessments will be paid regularly.
- 46. Q. As regards the woter-rate of Rs. 2, the rules in Bombay exempt land in which wells are suck from increased assessment, are you aware of that?—No; when the land is cultivated, they do charge. When the sorvey was being introduced, lands situated near the wells were assessed at certain water-rates. At the next sottlement, if a well has been cunk in the meantime, Government will charge an increased water-
- 47. Q. In the ease of land on which you paid Rs. 2 extra, is there any tank near that ?—No.
- 48. Q. (Mr. Mair-Mackenzie)-What is the sub-soil water-rate P-I don't know.
- 40. Q. (Mr. Rajaraina Mdir.)—Do you know of many cases in your village, in which such extra charge has been made?—No; there may be many, I only know of one.
- 50. Q. Supposing takavi is givon at 2 per cent., repayable in 20 years, will you not be in a position to sink more wells in your land ?—I would sink more wells, if I were assured that no further assessment will be leviod.
  - 51. Q. For ever ?-Yes.
- 52. Q. Supposing you were told that in the next 30 years there would be no locrease of water-rate, and after that o low enhancement for nnother 30 years; what would be the result?—I cannot pay anything loore than I do at present.
  - 53. Q. What is the rate?-More than Rs. 5 per nere.
  - 54. Q. On all your land? Yes, it is not less.
- 55. Q. (The President)-Was it rounitted doring the fnmine?-No.
- 56. Q. (Mr. Muir-Mackenzie) Would you dig wells in black soil? Yes.
- 57. Q. What sort of erops would you irrigate on such soil f-Tobacco, rice, vegetables-in fact everything.
- 58. Q. Do regotobles grow as well in black soil os in gorat?-No.
- 50. Q. Does block soil want much more water than gorat ?—Yes.
- 60. Q. Is it beneficial to irrigate cotton ?-If it is watered when rain is short and the cotton crop commences to dry up, it will rovivo. I have not seen it done.
- 61. Q. If Government were to advance the capital for a well without laking any return, neither principal nor interest, would the ray at he willing to dig wells and then pay begsyat?

  Not the full bayayat rate.
- 82. Q. How much an acro? -One anna more than the present rate.

- 68. Q. Were many wells undeduring the famine in your neighbourhool?-About 10 to 15 wells were dug.
- 64. Q. Have they been used this year?—Government wanted to charge a water-rate, and so they were filled up-
- 65. Q. Who said that Government wanted to charge a water-rate?—I was questioned who I dog a well in Government land onto do my occupancy without permission.
- 66. Q. Do you suppose that, if you due a well in your own land, you would have to pay a water-rate afterwards.—Yes.
- 07. Q. Do you mean, when the settlement is revised, or will it be done at once f-This year I have been charged a water rate.
- Mr. Wales, Collector of Surat, explained that witness took nater from a Government well, and had lo pay.
- 6S. Q. (The President)—Is it your impression that, if you take takeve aleases and put down a well in your name land, there will be an enbanced rate?—The well I took

water from was not in my own occupancy; it was built by Mr. Gold's

69. Q. (Mr. Muir-Maclenzie) - Which is the more profitable crop, rice or culton? - Cotton.

70. Q. If lanks were made, would the people be ready to grow rice lostend of cotton f. They would sow lice and ection tegether.

71 Q. Do they ever put rice and cotton in one kiari. One furrow for rice and another for cotton? - They have no kiaris in my part.

72. Q. If a tank were built, would they have kiaris? They would put them in fields near the tank,

78. Q. Which would be more profitable, rice or cotton? tice is more profitable.

74. Q. (Mr. Ibbelson) - Do they grow rice without irrigition? - No.

75. Q. (Mr. Muir Maclenzie) - Are there any water-pogged lands in your village ?- No.

WITNESS No. 21 -Mr. Motibnai Bhagwan, Landowner, Amod.

9th Dec. 01.

1. Q. (The President;-Where do you own land?-In Amod taluka.

2. Q. Have you wells on your land ?- I sank a well in 19 10.

3. Q. Did you get water?- Yes.

- 4 Q. How much land have you got ! 500 deres.
- 5. Q. Have you many wells?-No, only one well.
- 6. Q. Dld you build that by laking a loan from Government!-No.
- 7. Q. (Mr. Ibbetson)—Did you get the money from n bania ?—Yes, I got the money from the sourcar.
- S. Q. (The President)—Why did you go to the sowear in preference to going to Government?—This was at the commencement of the famine year, when lukavi was not
- o. Q. Do you propose to make any more wells on your land?—Yes.
- 10. Q. Will you then go tack to the lania again? -For the last three years the sourcers have not lent money, and so . I will go to Government.
- 11. Q. You have had the experience of this famino in the last few years, do you think you would have been in a better position if you had had wells ? Yes.
  - 12. Q. Are there many wells in your taluk? -No.
- 13 Q. Are your neighbours prepared to dig more wells in the cy at of famine?—Yes.
- 11. Q. Have they begun to take advances f-They don't get a sattleient amount of takavi-
- 15. Q. What is the difficulty?—Government only alsomers up to Rs. 500, and that is not enough to build a well.
- 16. Q. How much does a well cost in your talula?-
- 17. Q. Is the water very deep?—Water is found at a resumable depth; a well must be sunk very deep in order to have water always.
- 18 Q. (Mr. 'Hile'can)—flow many roots are there in a well costing Re 2000;—51x, if water is sufficient. If not, 2
- 19 Q. (The President)-How many feet down is the mater antique?-Alant 15 hands, but in order to make the mater personal, we should go down lower.
- 22. Q. If you were a little hing of your own taluka, what well you coto make it little nitherend another familie in little with successful, talks made and a canal brought in, we all to five.
- 21. Q for their any timbs non F. There are timbs, but in we have next in them.
- 22 Q Howeve young that to got water in them in a year of heavy the Pierr thereto ex-
- 23 Q. Me. Phile 13—When you loruned mores from the form to make this well, which factored did you pay?— & z me tert.

- 24 Q. Do you know whether you will have any additional revenue assessed upon it?—When the survey revised, I will be charged something extra on account of the well.
- 25. Q. You say that the tanks were dry in the famine and did not do any good Could you dig a kachchn well in the bed?—Yes, we sank wells in the beds and grew fodder in the famine.
- 26. Q. (Mr. Rojaratna Mdlr.)-What area does the well irrigate?-Twelve acres.
  - 27. Q. How many kes P-Six.
- 28. Q. How many crops did you raise from that ?-One; there was no foother for the cuttle, and I cultivated for the sake of the fodder, but mying to the severe cold it was not
- 20. Q. Are you irrigating a larger area this year? This ear ruts have destroyed the crops, and I have not been able to irrigate moch.
- 30. Q. These two years have been rather unfurtunate; at do you not think that well cultivation will pay eventunlly ?-Yes.
- 31. Q. Could a well of six kos irrigate a much larger area than 12 seres?—In a good year it will irrigate 20 acres.
- 82. Q. You said that at the revision of settlement the assessment is likely to be enhanced: have you any idea of the probable amount of the increase?—No.
- 33. Q. Do you think that the fact of your having dog n well will lead to n greater enhancement of your land as contacted with your neighbours' lands where there is no well?—Yea it will.
- 34 Q. Do you not know that under the rules, there should not be any enhancement ?—It will be raised, I think
- 35. Q. (Mr. Muir-Mackenzie)-What is the soil of your land?-B'ack and gorat.
- 36. Q. What is the soil of the land on which the well is built?—Mirri (mixed.)
- 37. Q. What crops do you intend to grow in ordinary years ?- Juani, cotton, and veg tables.
- 38. Q. Are you going to use well water for cotton?— Cutton will be benefited by well mater during such years as
  - 39. Q. But in ordinary years !- No.
  - 40. Q. When did you build your well ?-In 1900.
- 11. Q Hes any increase of assessment been yet demanded ?- No.
- 42. Q. Are you affeed that it will be?-Not until the revision of the S-telement.
- 43. Q. Is that the general fear in the country? Some people large that fear, but there who kind say that will not be the case.
- 1t. Q. Which is the most profestle, rice or cotton?— The people of Private rice and editor together; if rice can be lerigated, they get cotton and rice as well.

Mr. Moti-bhai Rhagican. Mr. Ali Akbar. 9 Dec. 01

# WITNESS No. 25 .- ME. ALI ARDIE, Executive Engineer, Surat and Broach.

## Answers to printed questions. I.

## SURAT AND BROADE DISTRICTS.

## 2. Culturable and Irrigable Areas, etc.

				Gross Area.	Culturable	Area under Tank Irrigation (Government).
				Acres.	Acres.	Aores.
Sorat			•	1,059,423	825,372	12,362
Breach	•			938,791	692,680	950

## Rainfall.

			Average of twenty year, 1961.	Naximum.		Minimum.	
	•		In. e.		In. c.		In. e.
Sur Chorasi T			42 56	In 1894	65 03	In-1599	18 49
Olpad	do.		35 30	,, 1891	52 93	., 1899	11 22
Bardoli	do.		51 16	,, 1S9 <b>4</b>	73 63	,, 1599	17 62
Mandri	đo.	•	51 Of 1	,, 1853	60 85	,, 1929	12 95
Chikhli	do.	•	67 09	,, 1593	169 82	,, 1500	24 45
Jalalporo	đo.	•	52 19	n 1851	82 51	,, 1899	24 85
Bulsar	đo.	•	65 67	,, 1893	DO 59	., 1899	36 97
Pardi	do.	•	74 61	,, 1892	111 09	,, 1599	31 16
	T.			!			
Broach S			41 87	In 1893	63 69	In 1890	10 61
Amod	đo.		36 49	,, 1591	67 05	1599	4 50
Jambusan	r đo.	•	34 53	, 1834	65 62	,, 1899	7 35
Vagra	do.	•	31 82	,, 1891	51 77	,, 1499	5 16
Ankleshy	ar do.		35 61	1891	6L 59	,, 1899	12 28
Hansot	do.	•	82 07	., 1991	52 74	,, 1599	9 87

Snrat is an important rice-growing district. Rice cultivation is dependent ou tank irrigation, and there is a demand for water throughout the mousoon. In Breach (except the Ankleshvar Taluka, which in its agricultural features resembles Surat), there is no demand for water during monsoon. Rice requires two to three fleedings between June and October. The last flooding is most important, because it easures a good harvest of rice and n second crop of val. The distribution is controlled by arrangement amongst the villagers thomselves. The irrigation revenue is realized in the form of increased land gation revoune is realized in the form of increased land assessment and is in the proportion of 10 of land share to 4 of irrigation (water) sharo.

3. Black Cotton Soil.—Small tanks constructed in hlack soil hold water very well. Existing dams are of this hlack soil hold water very well. Existing dams are of this soil without masonry core-walling, and I think hlgh dams could be made of it, provided they are protected by yellow earth or meoram covering. Black soil emeks whea dry, hat is very rotontive when wet. Surface protection would, therefore, tend to keep it moist. As yellow and kunker soil is always obtainable at varying dopths below the black soil, there would be no difficulty in providing the surface covering of a depth of two to three feet. There is always demand for water during the mousson as described above. The area of irrigation under ouch tink being fixed, there is practically a constant and uniform demand. The assessment being also fixed, there is no variation in revenue. ment being also fixed, there is no variation in revenue. Broadly speaking, and excluding patches of sugar cane. I believe the tanks do not command other classes of soil nor trigate other crops than rice. There is a tendency on the

part of the people of Surat District to extend rice cultiva-tion from tanks, but such is not the ease in Broach. I think their extension would be very useful and romunera-

4. Government Irrigation Works.—No works of the kind have oither been constructed or are in progress in these two districts. Tapti Irrigation canal was the only work which was proposed before the last famine (1899-1900), but since then two projects, namely, "Untewn" and "Amba Pardi" tanks in the Maudvi Taluka, have been drawn up, and although every endeavour has been made to find up, and although every endeavour has been made to find out fresh tank sites, it has not proved successful. Detailed information and estimates in connection with these projects information and estimates in connection with these projects have been supplied to Mr. Bealo, specially appointed for this purpose, and I understand he havealt fully with the matter; but I give below my views regarding irrigation from the Norbudda and Tapti. Deep black cotton soil forms the bulk of the two districts. It is a well-known fact that this soil is not suitable for irrigation. Rice is the only kind of irrigated crop which at present flourishes in certain farourably situated anall areas, and it requires conjous favourably situated small areas, and it requires copious water-supply for fivoding during the meason menths (June to October) only. It also requires a good deal of manure which would not be available for irrigation of extensive areas. Cotton and juwar are the two crops which are grown very extensively. For both these crops the soil are grown very extensively. For both these crops the soil is extremely suitable, and specially so in the case of cotton, which thrives us spite of great variation and uncertainty of rainfall. This I can assert from the experience of this year, as although the mins held off since "August" cotton has not suffered to any great extent. Jowari has suffered somewhat more, but still both these cropance expected to give fair results unless the plague of rats which has already caused a good deal of damage would cause further destruction. destruction.

the danger of water-logging and consequent effect upon the lealthiness of the climate of the large areas to be brought under irrigation is also a factor which requires serious consideration. For the above reasons, and the facts that the soil is best suited to jimyat outtivation and the general immunity enjoyed by the districts from serious famines, I would hesitate to recommend the waters of Neibudda and Inpli being utilized for irrigation. The works would be very costly and of doubtful utility.

5. Provincial Irrigation Works.—We have no such works.

works.

o. District or Fillage Works.—Statistical and general information has been supplied to Mr. Bealo and I see no good in repeating it here. I should, however, like to say a few words about their usofulness and possibility of extension from personal experience. Almost every village has a tank of some kind or other from which in many cases little areas of irrigation are practised. If these tanks are carefully examined and such as appear promising are sarveyed, I have no doubt that several tanks will be found carefully examined and such as appear promising are sarveyed, I have no doubt that several tanks will be found which can be enlarged by building pakko wasts weirs or self-acting sluices at the inlet so as to raise their full supply level. A systematic and careful survey of every tank by a special staff is necessary before any defiaite conclusion can be arrived at as to the extent to which extension would be possible. I have observed that in several cases the inlet channel is overtopped after the tank is full, and in the surrounding fields water lies to a depth of 2 to 3 feet, and gradually drains off into some adjoining nallab. If self-acting sluices are constructed asstated above and water is impounded in the tank up to the highest level it has reached, I am sure the capacity could be considerably increased. Leaving aside the question of irrigation, these tanks are of the greatest value as protection against drought and easuring good drinkable watersupply to the villages. In the Broach District irrigation from tanks is very limited, but during the last famine several tanks were largely excavated and enlarged. In the menusoon before last every one of them was reported to have completely filled. In the monsoon just past they did not quite fill, but are holding very fair quantity of water. Two or three cases have come to my knowledge where water-supply from wells was formerly brookish, but last hot weather it had vory much improved. Extension and enlargement of tanks are therefore in my aphition the most useful form of protective works we have in these districts.

7. Wells.—I have supplied whatever information I had to Mr. Beale, from which report I quote below paragraph 3, which formulates my opinion about the extension of irrigation by wells.

Mr .tii .t&sr.

o Der Ol.

"Paragras 3.3—As for extension of irrigation of wells, I would not advice its being undertaken on any large scale by Government. It is a well-known fort that the black cotton soil, which forms the balk in both the districts, is not suitable for any other kind of inrightion except rice, a direct requires copious water-samply. As farmine protective works, three wells would be of trey little use either. The expense would be ent of all proportion to the good that would result. In the lack roll tracts the wells do not contain abundant supply of vater, ord in a bad year the supply to all dwindle down to such a small quantity that barely an acre could be irrigated from it. Water would often become brackish and even rall, which is useless for itrigation."

8. Desirance Weeks—All the deviance works that

8 Brainage Works.—All the drainage works that rece known to be required have been carried out with the exception of Olpad drainage works, alont the utility and desimbility of which further enquiry is necessary. There is a general impression in Branch, and I have been told by some villagers that by the construction of these drainage works the surface will, which acts as manure, has been washed away and injury has been caused to the land. But hit is a matter about which I am not in a position to form an opinion from personal knowledge.

# 9. Works executed by Famine labour .-

## Classification.

				Amount.	expended.
Name of wor	Surot.	Broach.			
Prainage channels Village Irrigation tank Rechantions Village tanks Reads, earth work Collecting metal	To	i		R4. 454 2,41,016 22,511 312 2,61,135	Re. 1 07,554 2,77,460 1.01,413 18,64,556 98,335 12,161

All the works which remained uncompleted at the end of famine and which it was considered desirable to complete, have since been either completed or are in progress, and produced the advantages which have account from the village tanks in paragraph 6. In every ease tanks filled up to F. S. L. in the mousoon of 1900. Absorption was rather rapid in the first year, but it has reduced this year.

10. Programme of Relief Works.—Revised finnine programme lies been published which gives detailed information.

I summarise the figures below:

Published   Publ		AT CAN I FOR BIX				•	
Princh Patrick	<u> </u>	Propos					
Am -1	hers.	Tonks	Others.	Tanks.		ich District.	De ac
Free District.  Mar Ini Talora	1,551 1,651	27,254 20 (009 27,254	2,193 2,493 5,1°3	13.267 E.105 2.1.53	• !	นั้น. อีว. ทั้ง.	Am -1 Indicese Value
Max in Talors	0,273	119,033	10,093	(7,27)	, !	JA116T	
Janifer da' (4 483 ;   14,000 i	\$105 \$100 \$100	10,1,3	***	1000 ( 8 619 s		Calults . if o, if i, a	Marki Ta Gal. Lat i Curan
Bulrat do, 12:13 1611	4** 4** ***	1007 i 2012 i	407 100	0 1/2 12 2 3 3	•	da. da,	Ci ikbil kulrar

it will be derror that for k execution is the principal from making, more and that the make me well distri-tuted. The appraisance can be extended with even when

required, as an estimate for took excavation takes very little time to prepare.

## 11. A .- třeneral.

1. Strai and Bronch Districts.—I have been in charge for the last three years, and had to make arrangements for the supply of water in the famine.

2. The average rainfall Is as undec: -

	N:	rath.			Breet.	Foral.	Lantak
Tronner		•			0.03	ons	
Febenner	•				0-07	0:10	٠.
March	•				0-01	•••	561
April	•	•				•••	1891 to 1960.
May.					0 07	0 12	
Jnne			•		6.35	1071	Lon
July				•	11:20	21:00	6113
Argust	•	•	•	•	7 D1	10-92	Averige of 20 years from
September		•			6753	8.46	10 0
October					1.45	1.00	lerab
November		•			0.11	0.12	1 4
December	•				0.00	0 03	
Aremge pe	T JE	12			35.67	50.05	1

- 4. Unsuitability of soil has alcendy been discussed in replying to the Memorandum of Points, paragraphs 3 and 4.
- e mnot be grown.

# B. and C.

We have no such works.

# D.-Tanke.

- 23. (1) All the tanks in the Surat and Beorch Districts get their water-supply from the rainfall on the catchment aren.
  - (2) By pipe outlets through the dam in different parts.
- (3) The supply is required from June to October. In the years of amplo sainfall it is sufficient; hot want of water is felt towards the end in years of scanty rainfall.
- (1) The variations in the seenes irrigated from tanks are very great. The area varies necording to capacity of the tank, the area commanded and whether the tank is used for dorrestie purposes or not-

An average imigation tank iccigates about 40 acres.

- An average irrigation tank needs to be standard of acres.

  21 I can only answer these questions rangilly. The principal unirrigated erops grown are juar and ectton, itsee are grown obtenuately and their value is, juar Rs. 15, cotton Rr. 25, or an average of, eay, Re. 2) per nere. Assessment being Rs. 3 to Rs. 31. Rice is the principal irrigation crop from tanks, and on its leing cut, and is seen after October. The yield is Rs. 37 for size and Rs. 13 for eat, or a total of Rs. 50 per acre. Enhanced as a sment on such lands averages Rs. 14 (Rs. 10 land share and Rs. 1 irrigation or mater share), and is collected by the Revenue Department.
- 26. The only instances I know are en all areas of sugar-cause in the Jalalpoe and Bulear Talubas of Surat to itees, where water is supplemented from wells after the tanks are C":-D"F.
- 28. The owner of the lard pare revenue to Government. The amount, elembertated in paregraph 24. The enlarged rate of a securent legal on the total area of the holding and is not dependent on the six a security ineighted.

Mr. Ali Akbar. 9 Dec. 01. So. The tanks are all in charge of the Revenue Department and are only periodically repaired on a requisition from the Collector by this department. The expenditure is confined (except under special sanction of Government) to 10 times the irrigation share and subject to condition that the villagers contribute 10 per cent, of this amount. The system is working well. The question of enlargement and extension of irrigation I have dealt with in my former report.

83. There is no doubt that slow eilting of tanke is going on, and consequently the capacity is being reduced, but there are no statistics of accumulation. There is no custom of regularly removing silt, but excavation is made at the time of periodical repairs to the extent required for repairing the bank.

## E .- Wells

The average depth varies from 40 to 60 feet, but observations are boing taken in different parts of the districts.

- 1. Q. (The President.)—You are Executive Engineer of the Districts of SarAt and Brosch?—Yes.
- 2. Q. How long have you held that post?—About  $3\frac{1}{3}$  years.
- 3. Q Were you in these districts throughout the famine ?—Yes.
- 4. Q. Can you say roughly what was the loss of population during the famine?—I cannot say.
- 5. Q. Is the country in Broach not indepted to the formation of tanks?—We cannot get water by flow from tanks so easily as in Surat, owing to the flatness of the country.
- 6. Q. Is the country flatter in Broach than in Surat?-Yos.
- 7. Q. What is the procedure in Surat, as regards repairs of tanks?—We generally take up the tanks that are in want of repairs in the order of their importance; those that irrigate a large aron we take up first.
- 8. Q. You have not an establishment sufficient to go round and inspect them?—No, the tanks are in charge of the Revenue Department.
- 9. Q. A tank might be in very had order and you might not hear shoat it t—I should think the villagers would very soon tell the Collector.
- 10. Q Did not tanks do good during the famine?—Rice was grown under them, and in soms talukas there was material good done; in places where there was not safficient minfall the crops died.
- 11. Q. Did they turn to the wells to help them ?—Not in the irrigated area but in the tank bed itself, kachcha wells were dug and fodder crops grown to some extent
- 12. Q. You say "there is a tendency on the part of the people of Sorat District to extend rice caltivation from tanks, but such is not the case in Broach. I think their extension would be very remunerative." You think there are places in Broach where tanks should be made?—That is my impression.
  - 13. Q. Has no survey been mado?-No.
- 14. Q. Will you tell us comething about this tank at Broach that we saw?—For the last 20 years there has been a question of the water-sapply to Broach from the Nerbuda and also from wells; this project was first thought of by Mr. Fardunjee, Executivo Engineer, who was for a long time in this district. He was here before the famine and got me to level the ground; we saw that there was a great deal of work wanted, we wanted a large central work for the famine and had no alternative, so this survey was hurriedly commenced.
- 15. Q. There has been no mistake about the levels?—No, but the revenue prospects and details were not considered earefully.
- 16. Q. Did the Collector, Mr. Cedell, approve of it?—Yes.
- 17. Q. Did the people themselves show any interest in the Broach receiver ?—No.
- 18. Q. There was no idea of irrigating from the tank?—No. It was intended for the water-supply of Broach, we could not make it sufficiently deep, the original project was for 20 fest of water, after percolation 15 feet would remain that was om-idered sufficient for supplying the low-lying parts of Broach.

The cost of a pakka well having steining of burnt brick and lime masonry is from Rs. 500 to Rs. 1,000, and its diameter from 6 to 10 feet; kachcha wells are not practicable and seldom found anywhere.

The wells of the kind described above are so limited and so little irrigation is practised from them, that it may be said to be a negligible quantity. There are certain limited tracts of what may be called natural bagayat lands where foreourable condition for well irrigation exists. There is copious supply of water at the shallow depth of about 26 feet, and a well of 6 feet diameter can be constructed at a cost of Rs. 300 only, and would irrigate from 2 to 3 acres of sagar-cane or garden produce. Such areas of bagayat lands occur on river eides and near nallah, and cultivation in them is intensive and requires no help from Government in the way of construction. The bagayat area of the kind mentioned ulove is extremely limited and does not affect the general question of well irrigation.

The question of extension of irrigation by wells I have already dealt with in my former report.

- 19. Q. It will hold water in 'au ordinary year?—After precolation and evaporation there will not be more than 3 feet of water, and that will not be sufficient for the water-sapply scheme.
- 20. Q. If you had proper outlets, would there be any demand for water for markets and gardens?—Yes, that is my impression after talking with people about it.
- 21. Q. How much money would you require?—Rupeee 8,000 would do it.
- 22. Q. You do not think that there would be an advantage in employing the watere of the Nerbudda and Tapti for irrigation?—I cannot say I have studied the question, but that is my impression.
  - 23. Q. Owing to the nature of the soil ?-Yes.
- 24. Q. Has any estimate been made of the cost of a curvey for sites of small tanke?...No, I have not done any surveys,
- 25. Q. Would you carry on each works before the famine came or would you leave them till then?—They would not be suitable for famine labour; they should be done as ordinary worke. Tarks are the best form of protection. I would improve existing tanks by providing slaices. This should be done at once.
- 26. Q. You say "all the drainage works that were known to be required have been carried out with the exception of Olpad drainage works, about the utility and desirability of which further enquiry is necessary." Have you worked out the Olpad project?—Yes, in detail.
- 27. Q. What is the estimate, roughly ?-I cannot remember.
- 28. Q. Have you may doubt about the benefit of it?—If we drain it slowly, as we propose, I think it will do good.
- 29. Q. What is the slope of your drainage obaunel?-1 in 1,700.
- 30. Q. You say the feeling is against carrying out the work ?—Yes, some villagers have asked me to apply to the Collector to prevent it being carried out.
- 31. Q. Why is that?—There is not safficient water, they want more.
- 32. Q. Supposing you put a sluice in the drain, won't that help matters?—Yes, but it would be a little more costly perhaps, as we have only one bridge.
- 33. Q. Would the drains remain full for very long?—At the worst perhaps four days; they are designed to carry off I inch of rain per day.
- 34. Q. You say that "the tauks filled up to F. S. L. in the monsoon of 1900"?—Yes, I particularly referred to tauks excavated at the famine time.
- 35. Q. They did not work?—They did not quite fill but they did some service, please see section 6 of my note.
- 36. Q. Do you know of any places in your district where water should be stored on a large scale?—No, before the famine we had a connoil consisting of the Superintending Engineer, Commissioner, Collector and some local authorities like the Hon'ble Mr. Chuni Lal, and tried to find works of that description, but no one could enggest any; the flatness of the country is against it.
- 37. Q. (Mr. Higham.)—Would it he may good to have a carvey of the country in greater detail with a view to finding sites for big tanke?—I don't think we chall be able

to End many sites of that description; by big tanks I mean such as have dams of some beight.

- 89. Q. You propose one tank in Surat? Two.
- SP. Q. One of them has been surreyed?-Both have been surreyed.
  - 40. Q. Have they been sanctioned!-No.
- 41. Q. What will they cost ?- I think one will cost a little over Ra 3,64,000 and one about Rs. 1,00,000. They are alternative schemes for one and the same tank.
- \_ 42. Q. What will they hold, roughly ?-350 million cuble lect in good years.
- 43. Q. Is that the only project you have been able to recommend?—Yes.
- 41. Q. It is no use surveying for more?-No, you might
- 45. Q. I don't understand what you want a survey for, what is the point?—We want to find out to what extent we can raise the full amply level and improve existing
- 46. Q. (The President.)—You merely want an accurate plan of a tank before you begin work upon it?—Yes, we have no information at all as to the drainage area, centents, cie.
- 4". Q. (Mr Higham.)-I suppose you know how high the tanks are filled, it seems to me that much time is masted in making anyreys, the object of which I don't understand; either the dams are too high or they are too low, cannot you raise them or lower them without making a survey?—These surveys won't take long, perhaps two or three days at the most.
- 49. Q. In regard to drains, von would limit the run off to one inch in 24 hours. Would not that be too fast; the complaint is that these drains take off too much water in dry years when you want the water?—One inch would be too fast to take off, if we wanted to stop it we would put in a regulator; in present these areas, which we propose to drain, are very much water-logged. The cristing drains were not designed for any particular run off. With security miniall perhaps one such per day would be too large.
- 40. Q. You propose to make regulators?—I have not been able to form a definite opinion.
- to. Q Why cannot the people control the water them-selves; don't they have banks running through their fields?
- 51. Q. The complaint is that the water carries off the surface soil, a regulator won't stop that, it seems to me that the only plan is to hold the water in the field by bank until they get what they want?—Yes, no doubt.
- 52. Q. Cm the engineers stop the drains being too effective?—We can stop the flow by regulators, this would check the water golug into the drain.
- 53. Q. How deep is the drain below the surface?—Two to 3 feet; further down, out of the water-logged area, it is deeper.
- 5t. Q. Could you not hold up the water by hunds f-Yes it would require an establishment; we would require establishment for regulators too.
- 55. Q. You have designed some new drains, are they going to be constructed?—The project has not been designed yet, none of the Revenue Officers have been asked yet about it.
- 56. Q. With regard to the Tapti count, is there room for both the causal and drainage works, wou't the causal interestly the present water-legging i-It probably would.
- 57. Q. Yen say the Brosch tank was made for the enter-spels of the lown; is there any reason why it cannot be deepened to the depth to which it was originally designed?

  Yes; if Impressantic work was required; no doubt they would require to take the water out of it, that is
- f.s. Q. It was designed to be 12 feet deeper than it is no pre- note. Yes.
  - 59. Q. What is the soil ?- Yellow clay-
- (9) Q. If you went on, you would not get through the clay letters !- No.
- 61. Q. Is it ere any ites of continuing operations?— Only in the case of a large famine.
- ey. Q. If cleared to its fail depth, would it be sufficient for the mater-supply of Breach !- Yes, it is calculated that

- 63. Q. Sapposing you have a der year î-It would leve sufficient water for the next year.
- 64. Q. You have spent nearly 10 lables on these tanks in the Breach District. This tank in Breach cost only 4 to 5 lakl as - You
- 65. Q Where are the other tanks?—There are about 27 tanks in different parts of the desiriet.
- 66. Q. None of them were intended for irrigation ?-Very fem.
- 67. Q. They are village tanks?—They are only for domestic supply, on a few we hope some initiation will be possible, but they are small.
- CS. Q. You could not find irrigation tanks in Breach?—No, they are below the ground level, they are simply hollows in the ground and would require lifts.
- 69. Q. You could not find sites for flow irrigation?-
- 70. Q. (Mr. Ibbetson.)—How long have you known these parts?—For 3% years.
- 71. Q. Do you work the 10 per rent, contribution unle in regard to the rep dies of private tanks ?- Yes.
- 72. Q. Supposing a village does not give 10 per cent. ?

   Wo submit the papers to Government and very often the Collector gets it from the Local Fund.
- 73. Q. I cannot onderstand about the survey for new sites for tanks, I understand no sites are available for blg tanks; putting that a-lde, do you recommend new sites for small tanks?—I blink enlarging of existing tanks would be more useful.
- 74. Q. You don't think it would be worthwhile to look for sites for new tanks?—No.
- 75. Q. Rice is grown without Irrigation?—No rice is grown, except when it is mixed with cotton, then it is grown without Irrigation. I believe in Broach there is rice mixed with cotton on dry areas, but only in limited areas.
- 76. Q. You say that sice requires a good deal of manure which is not available, and that this limits the extenden of cultivation; is rice never grown without manure in these districts, or do you mean that without manure rice won't pay a water-rate f—The crop would not be worth growing.
- 77. Q. Is there any rabi grown in these parls besides the second crop on rico land?—Cotton only.
- 78. Q. No wheat or barley f-I don't think so.
- 79. Q. As regards the improvement of the small tanks which you propose, do you think Government would get a return on the money spent?—Yes, certainly; If we increase the water-supply, they will grow caue.
- 80. Q. Would you get more revenue from that?-
- 81. Q. Would you bring new land under irrigation ?not be the ease.
- 82. Q. You would only improve the supply to the existing area  $\hat{r}$ —Yes.
- 83. Q. Would the Government get extra revenue suffi-
- 81. Q. With reference to what you say in paragraph 21, we have been told by some winers that the eredit allowed to water is not sufficient?—I think it should be larger.
- S5. Q In the case you quote, do you think that instead of taking 11s. 4 out of 18s. 11 as the irrigation or mater share you might take Rs. 10 out of 18s. 14?—Yre. Re. 10 as irrigation share and Rs. 4 as land share in order to be fair.
- 80. Q. There are a pumber of small tanks which Government cannot put into order; supposing Government made over the water revenue to Israel Boards, could three put the tanks into order?—Yes, if they got a better professional ertabliel ment.
- 57. Q. Do you think that the agency could be improved?—I should rectainly profer that they should to done under the experision of the Public Worls Depart-
- ES. Q. Supposing Gorernment said these tanks are too small for us to repair; rather than let them po altogether, would it be a prof thing to use the aponcy of Local lioures; if they were given the revenue, notif they do the work fairly well!—Yes.

Mr Allar.

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89. Q. Is there any hope of golting the people to do it Mr. Ali Akbar. themselves P-No.

9 Dec. 01. would do it better than District Revonao Officers?-It means it would be nuder the District Revenue Officers.

91. Q. (Mr. Ibbetson.)—I understand that there has practically been no famine in Surat ?—No.

92. Q. In Broach?-There was bad famine there.

93. Q. Are you supposed to keep ap a famine programme in Surat?—Yes.

94. Q. Is it ready ?-Yes.

95. Q. You state in your programme the number of people for which labour is provided, have you may standard with which to compare that number, to see if it is sufficient or not?-That is kept by the Collector.

96. Q. Have you maps showing the distribution of works ?-Yrs.

97. Q. Are they printed ?-No.

98 Q. The works might all be in one corner of the taluka: - Perhops, but the talukas are smell.

99. Q. Does your programmo inolade village works ?-No.

100. Q Why is that?-- The village programme is kept by the Collector.

101. Q. Do you know unything about it ?-The Collector selects the village tanks and estimates are got out.

102. Q As far as famino works go you are ready ?-

103. Q. And the larger public works schemes are ready?—Yes.

101. Q. (Mr Rajaraina Mdlr.)—I was told at Bronch that the level of the town is much higher than the level of the tank. Is that correct?—Some parts are.

105. Q. The greater portion, I was told?—About one-third at least is lower, we could give water by flow if we had

106. Q. Two-thirds of the town would require it to be pumped ?-Yes.

107. Q. Considering the nature of antrounding soil (black outton) will not the tank get silted up soon; and what area will it irrigate in its present condition?—The tank will not silt up so rapidly, it would irrigate about 600 areas by lift, not by direct flow.

108. Q. Could you pump water in that soil without reservoirs and filters?—Wells would be made and it would be pumped from them to prevent dust getting into the pumps-not deep wells.

109 Q. How many millions does this reservoir held ?-21 millions.

110. Q. What is the area under rice in Surat?-11,000 acres, the total irrigation is 125,0 30

111. Q. Has there been any appreciable increase in the rice area in the last tea years?—No. I don't think so.

112. Q. You said in reply to Mr. Ibbetson that two or three days would suffice for the survey of each tank?— Yes.

113. Q. Is not the existing staff capable of carrying out and a survey?—Our establishment at present is just saob a survey?—Our establishment at present is just onough for ordinary works; it would require good trained men.

114. Q. Ovorscers would be sufficient?-Yes.

115. Q. You also said in raply to Mr. Ibbetson that the return on some of the works oven after repair would be very little; supposing Government derived no increased revenue from these tanks, would you not still advocate their thorough repair to provent further detorioration?—It would be a useful work.

116. Q. Apart from famine considerations, considering the present condition of the tanks ?-Yes, I do not

recommend these repairs only; but extensions and enlarge ment of the tanks.

117. Q. Do you think it would be economical to pump water from the Norbudda and supply it for purposes of irrigation !- I think it would be too costly.

118. Q. Supposing masonry banks were constructed for the erection of mots, would that he cheaper ?-I think it would cost a great deal.

110. Q. What is the rise of the Norbudda on the averago ?- 10 feet, there is a difficulty about salt water.

120. Q. Does the tide go high up?-About 10 miles nbovo Broach itself.

121. Q (Mr. Muir Mackenzie.)—Do you believe rice cultivation could be largely extended in Broach by means of tanks?—At present the cultivators are not inclined to do it. if a good sopply of water were given, they might be induced

122. Q. Would it be more profitable than cotton ?-I cannot say.

123. Q. You say "the area of irrigation under each tank being fixed, there is practically a constant and uniform domand." Do you mean that a larger area might be irrigated by tanks?—In some eaces it might be.

124. Q How do you mem it is fixed? - The water is only given to a certain fixed area.

125 Q. (The President.)-Do you mean if a tank one year had twice as much as another, the area would still be the sate P - Yes, the surplus water is used for domestic parposes.

126. Q. (Mr. Muir-Maclenzie.)—Are there many other sites on which tanks could be made?—I don't think there are.

127. Q. I mean as regards Sarat as well as Broach?-

128. Q. Do villagers semetimes apply to have now tanks made ?-No.

129. Q. I heard of an application the other day ?-Each cases would be very rare.

180. Q. (The President.)—Would the people in Surat like more?—They would like better tanks.

131. Q. (Mr. Muir-Mackensie.)-You don't think it would be worth making a survey to find eites?—I don't think it would be possible to find many sites even after a survey was made.

132. Q. You gave me the impression that you thought most of the rice irrigation was under tanks, but there is plenty under Akushia ?- I dea't know.

133. Q. In Chikli there were at the original survey 8,221 neres of rice, do you believe that that is almost all under tank . ? — In Chikli taluka the vircamstances are posuliar; I only refer to irrigation rice.

194. Q. In Bronch it is true that except under tanks there is very little rice except when mixed with cotton?— Except in Anklesar there are many places in which rice nnder min water is grown.

135. Q. Do you know if any advantago might be derived in water-logged areas by meking tanks within them and leading drains into these tanks !—Yes.

196. Q. (The President.)—Do you think the levels would admit of that?—It would be simply excavating a hole in the ground.

197. Q. (Mr. Muir-Mackensie.)-De they lift water from tanks here ?-- No, except for sugar-cane.

138. Q. Do these drains silt at all !- Yes, when there is back-water in the stream iate which they fall.

139. Q. You know nothing of the injury to the surface soil?—No, I have not seen it, I have only heard of it.

# WITNESS No. 26 .- DESAI DULABHRAM SAMBHURAM, Laud-owner.

Answer's to Frinted questions.

Paragraph 2.- I do not know the area of oulturable Mr. D. D. lands in eacu district. This can be obtained from the dis-Sambhuram. trict records. As the rainfall is deficient in Gujrat, the orops do not grow properly. Rice crop in husk requires to be irrigated. Rice crop requires at least water five times. 9 Dcs. 01.

The rain should fall in the months of Akhad, Shravin, Bhadeiva and aso at intervals for the rice crops. Revo-nue is not recovered as there are no irrigation works.

Paragraph 3.—Small tanks excavated in black soil cannot hold water. Block soil does not require to be irrigated,

ere le sufficient rain. Goraf frud can le bester be as sicre is some at van. Goral and can be bester benefit all by irrigation than the Black sol. If there is sufficient trainfall the owners of the Black soil do not require irrigation. But if the sain is not sufficient they require the all of irrigation in mising their crops. Tanks excavatal in Pack-soil do not hold water. Tanks in such lands should be excavated very deep and when the held becomes solid it bolds water.

- 4. Now the irrigation works are not going on in this di-trict. It would be beneficial if in the famine year there werhe are up ned. The water of the river Nerhadah be-cemes I rackish as far as Sakaltirath and beyond that the water of this river remains always aweet. It a channel to from the grace where the water rumains always aweet, or if the unter be brought from the Inpli river herigation works can be alrantageously utble d. There are re other big averaged leafing there were. I have not the presents of conone control of orought from the Inpli river lifterion works can be alrandageously utilized. There are no other big rivers levide, these two. I have not the neconits of cost focus red after repairing the irrigation works. These can be had from the Taluka Officers.
- 5. tire lands near old trinks have strendy been charged finavat: hence no other assessment is levied. I do not Illiunyat ; hence no other assessment is levied. Illimight; hence no other necessiment is levied. I do not know of any increase in revenue owing to the construction of registron works. If higher rates are levird on tanks to be a nativited henafter the people will feel them to be a burden. Provincial founds should be utilized in constructing inigation works; or new works may be built at fimp rial expenses. Provincial vates are insofficient to meet such expenses, Government money may be used for the
- G. Village and district works me executed by the Civil names or by the Public Works Department and the works are supervised by the Revenue officers. I have no records to show how much land depend on these works and how many such works are la existence. The nateracter is according to the original settlement credited to Government Revenues, and hence these works should be constructed at the expense of Government. Government has not to spend monog every year. People upply to Government when their village tanks are silted up and after due enquiry Concernment repairs or despens such tanks. Government do not semit the water-inte even if such necessary repairs are not made. Tanks and reclamation works have been done in the Lamine year, and I know not of other works. Such works were not undertaken by private individuals but they were made by the District Beard. Government should undertake the works for which they realize the water-intes and the District Beard should provide money for the tank which are used by the people for drinking water. I do not leave the works are constructed for the hence of the people they are such as the constructed for the hence of the people they are such as the constructed for the hence of the people they are such as the constructed for the hence of the people they are such as the constructed for the hence of the people they are such as the constructed for the hence of the people they are such as the constructed for the hence of the people they are such as the constructed for the people they are such as the constructed for the hence of the people they are such as the constructed for the hence of the people they are such as the constructed for the hence of the people they are such as the people they are such as the constructed for the hence of the people they are such as the people they are such as the constructed for the hence of the people they are such as the people they are the people they are the people they are the people they are they are they are the people they are they are the peopl then me suce to be pleased. If responsibility for such works note put on the people, nothing out he done or will be done. People cannot undertake such works.
- 7 I do not know the area of lands brought under cultivation in the ordinary years and in the famine year.
- I have an records to show the number of new wells con-structed each year during the last ten years. Government advanced a may to the people to emitted wells but I have no accounts to show the exact amount infranced. It is adno accounts to show the exact amount ulranced. It is advantaged to spread money in constructing wells in the lands fit for Begreat. During the famine very, i.e., 1809 to 1901, people managed to die Lacheho wells. I do not know it oid wells laving been required. Water can be found in the village of Diva, Divi, Survadi, Samut, Andada, Chlangra, Maladeway, Andheda, Chlangra, Maladeway, and Chorasi at a depth of 20 feet and the nell about contain 10 feet of water, and thus the total depth of the well can be fixed at 40 feet. In other rely transcription in the well can be fixed at 40 feet. In other villagies water can be obtained at n depth of 30 feet and the well chould have in it 20 feet of water, and thus the total depth of the well can come to 50 feet. The cost of n well having one descent rome to 10, 100 and a well of the lost 10, 700 and of feat Let Re. 1,000.
- 8 Line wife win rules the lew lying lands underlegged and by the increasest flow of nater the land is nealed
  away. Oralisms works are required at a few places.
  For such marks Generic ment should purishe money for improving the lands. Increase in Government revenue can
  be node by bringing the waste lands under collisation;
  and if the land is true from being unterlegged, the conworld thine and the Government revenue can be realized.

  By I have no records in about the mandation of model and
- b. I have no records to show the number of noths under-It has no records to show the number of not a under-taken do ing the familier year. Analoshan tank was ex-exacted doing the last tamine, but no 'Orata' his hom-erretracted and hence the people experience sone list's distriby. Isophe are benefited by this tank. Oning to the creation of the tank it he'ds water and consequently the people and eather have supple mater to creak.
  - 10. I do not in v.

Mr. D. D. Surfaces. II.1. The following answers are applicable to the Breach D Dec. 01.

I have served as a taleti for 43 years, and by experience

- 2. From January to the 16th June the rainfall is very slight and from 16th June to 70th June the rainfall is 10 inches, in July 20, in August 10, in September 8, and in October 4.
- 3. There are obstacles enumerated from 1 to 8 in the extension of irrigation.
- 4 I know of no man excupled from enhancement of neeestment of water-rate for the irrigation work constructed from private funds.
- 5. People do not take loans freely for the extension of the irrigation.

Reduction in the rate of interest, remission of interest can-Reduction in the rate of interest, remission of interest can-not induce the people to extend irrigation, if partial remis-sion is allowed onloof the sum advanced, wells may be dug in lands which are fit for Bagayat. But in case the water of the well turns out to be brackash, the expense should be borne by Government. Period of repayment of insulments should be extended by accepting a fit person for the surety. I do not few that the extension of irrigation will injure the remaining enlitration by drawing enlivators to the irriga-ted tracts. I know not of having noch a case occurred previously. previonaly.

## D .- Tanks.

- 23. I. The tanks are filled in by rain water.
- 2. Kiari lands are sown with rice crops. Water in filled in the kiari lands by enting a small channel from the lank. If the water in the tank in not sufficient for a flow by channel, cultivators use pots for supplying water.
- 3. If a rainfall is scanty the water would last for four rouths of the monsoon, and if the tank is dug very deep the water may last for eight months. In large tanks the water would remain for 12 months. In the faunte year the rainfall being scanty tanks would not hold any water; but if any does find its way into the tank, it would last only for a month or two.
- 24. The assessment on irrigated lands can be raised by
  - 1. By gelting two harvests instead of oor, the new ray ment can be raised by Rs. 2.
  - 9. Valuable grops cannot be raised in black soil. Corton, jour and wheat can be sown in the black soil, and therefore no enhanced assessment can be levied.
  - 3. In n year of numbe minfall, seanty minfall or drought no increase in yield can be obtained, but timely minfall would bring the proper burvest.
- 25. Late rounmencement would not being a proper harvest and may affect the outcome. Furly commescement cannot have such an effect and may be useful.
- 26. If a land is irrigated by means of water from the well and in a tract in which sufficient and timely rainfall has moistured the land, the harvest according from the land nutred by rain would be superior to the irrigated crop.
- 27. On the average, in a normal year or in a year of drought, the increase per acre of irrupated lands would couse to 18s. 20 ha a year of ordinary rainfall as also in a year of drought.
- 28. The coltivator and the owner of lands together would pay Rs. 2 more per acre per aunum.
- If the owner of the land pay the increased rate he would recover that amount from his tenant.
- The erbaneed water-rate in I-vied in the ardinary year or in the year of drought without regard being has for the actual area irrigated. The water-rate is fixed on the land and that is recovered.
- 23. The owner of the land incurs the expenditum required to the fie'd and in some cases the tenant if the condition is included in the" Ganotpala".
- 27 The expenditure on the exercation to the tank is as the expenditure on the exerction to the tank is lotte by Gorramont and the reciple having (kisti) the land percents subscribe a part, but the greater part of the superse lei crose by flowtrument. Begains are not required entry year, and Gorermann repairs the tanks of the layers apply for it. It is not possible to accertain the approximate supmal cost per sore.

Mr. D. D. 31. If a tank is coastructed by a private person he may Sambhuram. charge to others whot water-rate as he likes, and I know of no quarrel having taken place to this respect.

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- 32. No privato person can construct tanks if onconraged or assisted.
- 33. Tanks are not cleansed every year, nor are they excevated every year. The tank should he deepened 3 feet deep. Government excavates or repairs the tanks. People cometimes deepea tanks hy manuel lebont. I know of no case occurred where the whole tank was cleansed after it was once filled in with water.
- 34. The Brosch district comprises of five talukas and one Peta Mahal. The names are Broach, Wagra, Amod, Jembusar, Aukleshwar and Hansot Mahol.

The average depth of permanent wells in Ankleshwar Tulnka varies from 40 to 50 feet and in Broach and other talukos it varies from 60 to 70 feet. The water in many of the wells is sapplied from springs, and water thos eupplied lasts for a long time. The water supplied by percolation does not last long. In ordinary years the weter of the wells does not become saline, and to the famine years the water fails and becomes saline.

The cost of the well having one kos would come to Rs. 500, Rs. 700 for two kes and Rs. 1,000 for more. A well can be constructed within two to foor months. If a well is excavated deep and if good springs would be reached, weter would be abundant.

A well having 1 Los can irrigate 1 acre of land and a well of 2 kos eac irrigate 4 acres of land. That 1 kos irri-

- gates 2 acres. I bave no record to show the average area irrigated in one year.
  - So. Vide answer to paragreph 24.
  - 36. Vide answer to paragraph 27.
- 37. I have no record to show the approximate average annual rate per acre paid on account of irrigation. It will be known from district records. The coltivator pays to Government as weter-rate what additional produce he gots by irrigation. The loud under a woll is charged Himayet according to a certain rate per acre, and the rate is levied from the whole whether the whole of it is irrigated or not dariog the year.
- 38. Difficulties are often ecconatered in finding out water spots; hesides without reaching water it caunot be determined whether there will be sweet or brackish water. Similar difficulties are experienced in constructing the superstructure. I do not know of assistance or advice being given in this respect by Government.
- 39. In private property it is not necessary to construct well without the permission of the owners,
- 40. In a famine year temporary wells can be excavated and by these temporary wells barvest can be reised.
- 41. It is proper to lovy some water rate from wells constructed in Begayat lands in case of insufficient rainfall. Wells should be got constructed by advancing taken to rayats free of interest and repayable in instalments. If jirayat land is thus converted into Bagayat land, it should be settled whet rate to levy on such wells.
- 1. Q. (The President.)—(Through an Interpreter.)—Are you a landoweer?—Yes.
  - 2. Q. How mach lond do you own?—About 200 acres.
- 3. Q. Is your land irrigated or not?-1 have got lend in two places which is irrigated, and the other lend is jarayat.
- 4. Q. Are your lands irrigated by wells or tanks?—By wells.
- 5. Q. Did you lose your crops in the last famine?—Yes, in the jarayat land the welle dried ap-
- 6. Q. Was there much loss of life in your village?—Yes, and of cattle also.
  - 7. Q. You have only two wells?-Yes.
- 8. Q. Did you get any benefit from them ?-I was able to produes vegetables.
- 9. Q. How much did you irrigate from these wells ?— One nere and sixteen guntas.
- 10. Q. Could you not do more than that?—Under one well I have only that much land.
- 11. Q. And under the other well?-I have planted fruit trees.
- 12. Q. Have you envintention of extending the namber of your wells?—They would be useful in gon at land, but not in block soil.
- 13. Q. You have no black soil?—My land nader the two wells is gorat.
  - 14. Q. Have you any other gorat lead ?-No.
- 15. Q. What would you suggest should he done to prepare the country to resist another famine?—We should have tanks in the black soil, and there should be sufficient water in them to enable rice crops to flourish.
- 16. Q. Havo yon ear sites in the village where you can dig tanks?—There are tanks, but they are silted ap.
- 17. Q. If they bad not been silted up during the last famine, would you have got any water in them?—There was no rain and so there could he no water.
  - 18. Q. They did not do much good ?-No.
- 19. Q. Do you thick it is any use sinking wells in black cottun soil?—No, of no use.
- 20. Q. Connot juari he raised on black soil?—If there is rain juari prospers on black soil.
- 21. Q. If there is no rain cennot juari be irrigated from wells?—If there is a small rainfoll then it ceaned be irrigated from wells, because the wells are not full in October if there has been little rain. In block soil a good deal of weter is required, and there are very few wells which could give a safficient quantity of water to irrigate it.

- 22. Q. (Mr. Higham.)—Did you lose any cattle in the famine?—Very few, I let the laod to othere and did not own the outtle myself.
- 23. Q. You do not cultivate your land yourself, you lot it oot?—Yes,
- 24. Q. (Mr. Ibbetson.)—When did you construct your wells; in what year?—One well was made by my ancestors; the other well was sank about ten years ago by a tenant to whom the land was let on a lease of 40 years.
- 25. Q. Was that before the settlement survey or after ?—After the survey.
- 26. Q. No assessment has been paid as yet on account of the wells?—No.
- 27. Q. What assessment do you expect in the next revision of settlement?—To the best of my belief an assessment will be charged for the welle built by me.
- 28. Q. (Mr. Rajratna Mdlr.)—Are you aware that your land will not be liable to enhanced assessment in the general revision?—Yes, hat the cultivators are afraid that the assessment may perhaps be raised on those fields in which there are wells.
- 28. Q. As regards takavi from Government, do you think that the present terms are very liberal—the rate of interest 5 per cent. and the period of re-payment 20 years?—Yes, they are liberal. When a well is sunk and the man gets good water then he should be charged, and Government should take the whole amount back from him, hat should the water be brackish then Government should forego the amount.
- 30. Q. Would you recommend any farther concession? If Government charge water-rate then the people should be given some coacession in interest.
- 31. Q. Only if they are charged water-rate and not otherwise?—If the water found is brackish, then the whole amount should be remitted.
- 82. Q. Would you recommend any extension of period beyond 20 years?—I think that is not necessary; the money might be lost.
- 33. Q. Do you recommend a reduction of the rate of interest from 5 per ceot.?—I do not think it is fair to charge interest as Government derive benefit.
  - 34. Q. What beacht?-They levy a water-rate.
- 35. Q. If they do not levy a water-rate at all?—Then 5 per ceot, is quite fair.
- 36. Q. Do you mean that a water-rate will be obarged at the next revision of settlemoot or a special water-rate when the wells are built?—If, at the time of revision, the assessment is to be raised than the caltivators ought not to

be charged interest; but if the assessment is not called then interest might be levied at 5 per cent.

37. Q. You say that the terms, as they are at present, are liberal enough, then why do not the many take advances of taken and extend their will irrigation?—At present they have got no manure and no extile, and their mesons are not such that they can irrigate lands from wells; so what is the use of taking taken.

38. Q. You say that under one—them have been approximately and the meson of taking taken.

33. Q. You say that under one well you have no acre and a quarter, and that you have no further orea to irrigate;

would the neighbouring recats take unter from your well. Mr. D. D. and pay you for it i-1 would charge from Its. 2 to Its. 2-8 Sandhuran. per acre for the water. 9 Dec. 91.

39. Q. (Mr. Mair Maclessie.)—If you were to berrow money for a well, what into of interest would you have to pay to the Louis !—I'rom it to 9 per cont. per annum.

40. Q. Have you heard of people getting money fam the basis at from 3 to 1 per cent.?-No.

## Witness No. 27 .- Mn. K. R. Desat, Assistant Engineer, Broach.

## Answers to wrinted enestions.

Answers to prin

No. 3.—Vágra and A'mod Tslaksa and a greater portlan
of the Braz-h Täluka posess black roil. In Jombusar Tslala we mestly neet with yellow sail. The black soil of the
district is considered rich ection soil and the general opinion
is that it is unentable for irrigation. Cottom, rail, jumăr,
wheat etc., require but little rain and heavy rainfall would
ap it the crops. Black soil teing very resentive, it is probable that roots of plants would rot and, so long as people
stick to the kind of crop now shown, no irrigation acheme
can te worked successfolly. Area under well-irrigation in
black soil is certainly very small. Even vegetables are not
sown to any great extent by well-irrigation in black soil.
These facts tend to show that black soil is unmitted for trrigation and that is the general opinion. Jerigation is, however, practised on a small scale from village tanks even in
black soil. They generally grow rice, and this foct makes
one think a little before necessing the general conclusion
mentioned above. It is probable that with manno and
plenty of water the soil undergrees a clange und ndepts itself to irrigation. In the fifth mile of the Broach-Jambusay load one can see a small patch of garden land in black
soil, where usage and jambul flourish equally well. The
depth of water in wells und in mony finstances salts dissolved
in water seem to come in the way of well-irrigation, and
I do not think that the defect lies in the soil. If good
sweet virer water can be obtained fer irrigation, I think it
can be utilized even in black soil with profit. Small tanks
constructed in this soil bold water very well, and high
earthen dams can be made of it without a masonry core,
provided the surface is protected by a thick ceat of yellow
soil. Black soil in drying up contracts and cracks, and the
dam is likely to be injured if the surface is not profected.
At present prigation is practised on a very small sale from
village tanks, and there is always a demond of water for hrigrated crops as the

tanks which foil exactly when they are most wanted, while assessment with water rate on such arms is very high, and it is no wonder that the people should be access to irrigation; but, when an unfailing sopply has been given, I think that people would take to growing irrigated er. pt. The district is flat and so far attempts have failed to obtain a tank which can have even five feet bend of water. The only course is to obtain water from the Nerbuda, and as long as people do not change the kind of crop the channel cannot work with profit, for in ordinary years no water would be exquired by the land-owners. It would, therefore, he necessary to start a small schenocand let the land-owners see that it would be profitable to take to irrigation, and then the large scheme now before the Commission may be taken up with advantage. The land-owners have to undergo a large initial espenditure in the form of making hunds all round and manure, and they cannot afford to do it cales they are critain of the unfailing nature of the supply. One-half of the number of cultivators and labourers of the district cannot get work for screen months in ordinary years, and the result was evident in tha last famure. It is then fare necessary to have irrigation in the district which would gire work throughout the year to a good portion of them. As the large schemo cannot succeed all at once, I propose to pump up about 100 enhic feet per second of water from the Nar-badda between Janoro and Nand. This will be taken to a large schemo cannot succeed all at once, I propose to pump up about 100 cubic feet per second of water from the Norshaddu between Janoro and Nand. This will be taken to a reservoir constructed so as to insure three days supply. Main channel will be taken out from the reservoir. This would irrugate about 20,000 acres of famil in years of average rainfall. It is true that the pumpling arrangement is always dear, but the loss in the purchut case would be very an all. Even if people do not toke water, pumps can be ntilized for other purposes, such as woter-supply for towns and if the schemo succeeds, the larger scheme can then be taken op.

No. 8.—No more drainage works are required in the Breach District. All those that were required have already been done. Water-logged areas have improved and commow grow cotton. On the other hand, the villagers in the burn lands of Vagra complain that channels have washed may the lands too mach and have importrished the foll. The Mamlatder of Vagra also informed me that wheat did not grow well in portions of burn lands algoring the channels where it formerly flout-lands also have layer of sweet soil having been partially washed away salt appears on the surface and this has spoiled the lands. He considered that it would be the best to let the channels gradually silt up to some extent. some extent.

- 1. Q. (The President.)-You are Assistant Engineer at I tou-hf-Yes.
- 2. Q. How long have you been there !- About three TEBRE.
- 3. Q. Where were you before that !- At Thoma.
- 4. Q. You have been at Eruseb throughout the whole of the famine?-Yes
- F. Q. Were you to charge of the famine works?-Yes.
- n Q. (Mr. Moir-Maelennie.) Are yen a Cujmati f --
- 7. Q. The (Precision) You say in your memorardum at present irrheation is practiced on a very small scale form village tasks, and there is always a demand for irrheater crops as the rairfall is incuficient." You had alleding to the interpretary of any power, when there has been no rain, or do not tream all years F-At present no lare only a few tanks, and it is to these tasks that I refer.
- 8. Q. Do you mean to say that there is a demand for water, whether there is good rainfall or not?—If there is no minfall, there will be no water in the tanks.
- P. Q. Is there obusys a demand for water when there is a good rainfall?—Yes, it er use the water even in good years.
- 10. Q. Po you consider rice a more profitable crop il an cotton f W) en they grow rice they generally grow two crops, and therefore the rice crop is most profitable.
  - 11. Q. What do you grow after rice ? Grain.
  - 12. Q. (Mr. Mair-Mackentic)-And val i-Yes.
- 19 Q. (The President.)—Have you had anothing to do with repairing village touchs in your district f-Yes. I have repaired a few.
- 14. Q. Are they in good order f-They are penerally a lted up to some extent.
- 15. Q. What dil you do to them as famine relief works i-Dog out the allt and coloneed them.

Mr. K. K. Desai.

- 16. Q. By moking new bunds ?-No, hy estra digging.
- 17. Q. Deepening ?-Yes.

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- 18. Q. At present are there many tanks that you know of in good condition and repoir that will hold water, or are there only a few ?—Most of them are for domestic pur-
- 19. Q. I om tolking of irrigation tanks?—There are very few in good order; in fact there are very few tanks at all. There are bardly ten.
  - 20. Q. Hardly ten?-Yes.
- 21. Q. (Mr. Muir-Mackensie) Are there not some on the Aukleshwar side ? I am referring to the north of Broach.
- 22. Q. (The President.)—You do not think that you can find sites for more tunks?—We have been trying, but we heve not succeeded.
- 23. Q You say "One-half of the cultivators and labourors of the district cannot get work for seven months in ordinary years." That is very emprising. Do they live for trades months when the servings of fire results when the servings of fire results 2. Year for twelve months upon the earnings of five mouths ?-
  - 24. Q. They do not work ?-There is no work for them.
  - 25. Q. The country is cultivated ?- Yes.
  - 26. Q. And there is no work for them ?- No.
- 27. Q. You go on to say "It is therefore necessary to have irrigation in the district which would give work throughout the year to a good portion of them." Where is irrigation to come from !—I believe there is a project for bringing a canol from the Nerbudda which hos heen submitted by Mr. Beale.
- 28. Q. Is the country black cotton soil ?-Mostly black cotton soil.
- 29. Q. Yon say "These facta tend to show that black soil is unsuited for irrigation and that is the general opinion"?—We have small tanks where irrigation is practised; they actually grow rice. Although this is generally known as black cotton soil and unsuited for irrigation, this little fact shows that it is suitable for irrigation with good water. gation with good water.
- 30. Q. By building these tanks would there be an extension of rice cultivation?—Yes, and bagayat, froit trees and gorden produce.
- 31. Q. You say "A large scheme cannot succeed all at once. I propose to pump up water from the Nerbuddo." Have you worked out the expenses of that ?—I tried to get figures, but I could not get them.
- 32. Q What is the height of the lift from the Ner-buddn? -Ahout 60 feet. To start with, we shall have to begin on a smoller scale thon what I have proposed here.
- 33. Q. Can you lift about 100 enhit feet per second ?-If it succeeds we can increase the volume.
- 34. Q. You want a very powerful pump?-Yes, or a number of them.
- 35. Q. Havo you submitted this proposal to Government?—This is the first time I have mentioned it. I think pumping would be dearer than bringing the eansi up, but people would not take to irrigation all at once, and with pumping we could extend gradually.
- 36. Q. Have you ever visited the egricultural farm here ?-No.
- 37. Q. What is the feeling about water on black cotton soil. Does water do no good !— At first three inches of rain is required in black soil; after that the amount of woter. required would be about one inch.
- 38. Q. Have you got a programme of works for the next famine?—Yes, it is with the Executive Engineer.
- 39. Q. What do you think is the best work for famine lahour ? Digging.
- 40. Q. Whot sort of digging ?-Wo have tanks for Brosch, and we have olready got two reclamation projects. We have taken np these two projects, and if they succeed then more reclamation works will be undertoken.

- 41. Q. (Mr. Higham.)—How do you propose to get the supply of water ?—It is proposed to get it by a caual from the Nerbudda.
  - 42. Q. That is the only way ?-Yes.
- 43. Q. There is no other woy?—I propose to start in a temporary way by pumping up a small volume of water so that the people may learn to oppreciate it. Although there will be some loss to Government, yet on the wholo the project will be successful.
- 44 Q. You think it is possible that it may be connui-cally advantageous to convert ull cotton soil into wet cultivation?—Not all; about one-fifth of the whole area moy be irrigated.
- 45. Q. Cau you get water for it from the Nerondda ?—Yes; I wish to change the feeling of the people; at present there is a strong feeling that black soil is quantiable for irrigotion.
- 46. Q. Why do you wish to change the feeling?— Because there are small tanks where irrugation is practised successfully.
- 47. Q. Does not a tank put more water on the soil than rainfall?—Yes, they use tank water in oddition to rainmater.
- 48. Q. (The President.)—Hove you any cases ontside tank irrigation to show that it would be profitable to apply water to black cotton soil?—In Poons. I think, they have black soil like that of Broseb, and they use water there with udvantage.
- 49. Q. I suppose the difficulty in making u tank in Broach is due to the fact that there is no fall in the country?—Yes; it is all flat.
- 50. Q If there was some fall, it would pay to moke tanks?—Yes.
- 51. Q. And as you cannot meke tonks you propose to make causls P—Yes.
- 52. Q. Is there any other source hesides the Nerbudda for getting water?—There is no other source that I know of.
  - 53. Q. No springs ?-No.
- 54. Q. If you were to bring water from the Nerbudda into the Broach District, would it not have the effect of water-logging a great area f.—I here would be no water-logging, because it would only take place where there are hollows, but then we have draios, so that there can be no water-logging.
- 55. Q. If you brought more water by canal, would it not necessitate making more drains ?—No; at present they are considered too lorge.
- 56 Q. There are complaints that the drains take the water away too quickly !-- Yes.
- 57. Q. Do they dry up the land too quickly?—Water-logged areas hove certainly profited; it is the other lands which have suffered.
- 58. Q. The complaint is that the soil near the surface gets washed off ?—That is in regord to the lond lower down.
- 59. Q. Could not that he stopped by a bund?—Thot would be very costly; loud owners cannot ufford that.
- 60. Why would it be costly to make bunds?—If sluices were provided at each opening it would do. If there were bunds on both sides of the chaunels and if small gates were made at intervals I think that would do.
- 61. Q. Have you seen places where the soil is washed off ?-I have; my experience goes back three years.
- 62. Q. Have you inquired into complaints on the spot ?-I have been to Aladar, where one of the channels was opened out and the people there complained.
- 63. Q. What happened there?—On the surface there was no difference that I could see.
- 64. Q. Was the soil on the surface washed off?—The disappearance cannot be judged by the eye on the spot; it can only be orrived at from what the laud can grow after-

WITKESS No. 28.—Mr. KHANDUDHAI KHUSHALDHAI, Patel and Land-owner, Olpad Taluka. Answers to printed questions.

3/r. Khandu shai RhushalI am now 52 years and have been all my life a cultivator.

- 3. (2) Insufficient.
  (3) Insufficient.

- (4) Not suitable to black soil. Suited for gorat.
- (5) No.
  (6) Have got no sofficient funds.
  (7) No.

bhai. 9 Dec. 01.

Me. Klim dubai kan salikai

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6. Does not pertain to this taluka. Apparently people are willing row.

## D .- Tanis.

- 23. (1) Natural flow.
  - (2) Lift and supins and natural flow. Villagers whose lands are infigated engage two men who are paid in kind at the harresting of rice.
- 3. (a) Up to March.
  - (6; November.
  - (c) Nope.
- 25. (t) Rice seedlings will be too mature to be transplanted.
  - (2) Rice will fail.
- 20. From Rs. 25 to Rs. 30 per month. By the tenant.
- 33. Silt is formed about half a foot every year.
- 1. Q. (The President.)—You are a Patel and landowner  $f = Y_{\rm res}$ .
- 2. Q. (Mr. Rieten.)-Of what district ?- Surat district and tipad taluka.
- 3. Q. (The President.)-How much land do you own !-
  - 4. Q. Is it irrigated ?-Yes I have a well.
- 5. Q. How many wells ?-Onc.
- 6. Q. One well for 200 acres f-Yes.
- 7. Q. That is not much irrigation; how do you cultivate rice on your land !-I irrigate the land in which the well is situated. I do not brigate the rest of the land; it depends upon rainfall.
- S. Q. Did your elllage softer much in the famine ?-Yes.
- g. Q. What do you think is the first thing to do for your rillage to enable it in resist famine should it occur again?— Tunks should be extended as wells are not successful therr, when no dig a well deep brackish water comes op.
- 10. Q. Have you get tanks in your village ?-Yes.
- 11. Q. Hew many !- There are about 25 taoks in my village; they are all small tanks.
- 12. Q. (Mr. Rajaratua Mdlr.)—Are they all irrigation tanks:—No, only two me irrigation tanks. The others are Local I and tanks irrigating kiari lands.
  - 13. Q. (Mr. Mair-Markenzie.)-All of them 9-Yes.
- 13. Q. (The Prevident)—Why do you say they are not irrication turks?—Tanks which irrigate more than 20 a. 100 are say called irrigation tasks; those which irrigate less than 20 ares are not called irrigation tasks. They call that a task "irrigation tasks which are reputed by the Public Works Department.
- 16. Q. Are there tanks in good order i-They are not. 16. Q. What is the matter with them f-They do not hold water.
- 17. Q. Do you do anything to improve your task—dig it couldn't con hold more water?—We are not able to limp, we can tanks as we have no morey; we depend upon therefore at 10 do it.
- 15. Q. How much do these 25 tarks irrigate altogether? -Al out 200 acres of rice land.
- 19. It That is 200 ances of your own hald !-No, I am tolking of the whole village.
- 20.  $Q_s$  What is the arcs of the whole village F+About 1900 acres
- 11. Q. Of these 25) are irrigated ?-Yes.
- 22, Q. Populathish the tanks can be enlarged?—Yes; but their exercised?>
- 23 Q. Versay in the monormound me that said forms to the extent to fight at I disable terry year i-Yes.
- 21. Q. Who may res it ?-It is simply given work
- 25, Q. How long ago were tiere tonle charely when wis extisted out of them last !- Only two table were r purel, for Q. How long ago; low many pairs ago!--Ido
- extraction of the 17. Q. likithey lofter of tilt i—They were sifted up
- gleografics.

  2.4. O. 1889, West opplied to the part and unce dealers of the O. 1888 in Security we name that there.

## E.- Wells.

31. (1) 20 to 40 let.

(2) (a) No. By spring and percolation.

(b) Yes.

- (3) With trough from Rs. 700 to Bs. 1,000.
- (4) 100 rears and upwards if sweet. If bra-kish it lasts for 25 years.
- (3) Br kon.
- (6) 1 to 3 acres.
- (7) Depends so the nature of the crop, about 5 acres per annum.
- 37. Paid on actually irrigated areas.
- 38. (1) No.
  - (2) No.
- 39. No.
- 23. Q. Have you anything to say about the damage done by the drains already made f-Water has been taken out of some water-logged arens.
- 30. Q. Why do you want drains; is the land much water-legged? -A certain portion is leadly water-legged.
- 31. Q. Do you grow exten on your land?-No, all the land is water-logged and no rotton can be produced.
- 32. Q. (Mr. Hibetson) Is the whole village water-logged? About 1,000 acres ic.
  - 33. Q. (The President.) Inside the village ?- Yes.
  - 31. Q. No cotton can be grawn in that area ?- No.
- 35. Q. (Mr. Muir.Markenzie.)—How many acres are there in the whole village?—About 4,000 acres.
  - 36. Q. The culturable area is 2,050 ?-Yes.
- 37. Q. (The President.)—thave you heard convinints about the drains ?—I have never heard any complaints.
- SS. Q. We have been told that good soil is washed into the drains f-1 do not know; that is not my experience.
- SO. Q (Mr. Ibbetsen.)—How many of the 25 tanks were used during the famine year ?—They were not used at all, they were not drep and so were all elited up
- 49. Q. Did you dig kacheha wells in the beds of tanks?

  -Kacheha wells would not supply water to rice lands;
  the land is very andy.
- 41. Q. Would you like the Government to make more tanks there f.—If the Government made tooks on the water logged areas they would be of great use. If these water logged areas were conserted into tanks, they would be very useful.
- 42 Q. Are there any sites available untaide the water-logged areas !- Three are no other sites available.
- 43. Q. Have you paid any extra merement on account of your with F-No.
- 41 Q. Do you think it likely that you will have to pry any extra assessment on their occount?—No.
- 45. Q. Why do you not fear that there will be an extra assertment! Because it will not be increased for thirty years.
  - 45. Q. After that ?-It might le.
- 47. Q Do ran know whether you will have to pay an extra assessment after thirty years f—It depends upon the revision of extinuent; if Government raises it, then it will have to be pail.
- 49. Q. Are there many wells in your village i-No. It is very difficult to sink a well in nor village which is near the real the soil is undulating and sandy and wells are not practicable.
- 49. Q. (Mr. Rajeratan Millr.) You have nely one acli in the villege for irrigation f-Yer. It is impossible to sink nells as the lead is undulating and sundy.
- 59. Q. Po you think they would dig wills if they got talest on face make terms?—It is not possible to signed a seem if Generalization is alreaded the money.
- 51. Q. Out of 25 tacks, how many are there which indicately alon for smooth-There may be about for or how of these.
- R2. Q Wentlife raset le miling to take esse such tasis and loop them in requirit it conference is reduced by a redail ?—Pupple are ret in a position to do that.

Khadubhai.

Mar. 53. Q. Would it not be profitable for them to do it?—
Manibhai They are not able to spend any capital on land.

54. Q. (Mr. Muir-Mackeuzie.)—How much kiari land is there in your village?—More than 200 acres.

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- 55. Q. There are 25 tanks for 200 never of kiaris?-You.
- 56. Q. Do van think that it would be a good thing to make tanks in the water-logged soil ?—Yes.
- 57. Q. Was any application made to Government about thir ?-No; but we have asked the local officers to make draios to remove the water.

58. Q. At what rate roold money be borrowed from the banias of your village ?- From 13 to 15 per cent.

50. Q. Can you yourself get money for less than that?
-Not less than 6 per crnt.

- 60. Q. There are no waste lands ?-Ail the waste lands are salt.
- 61. Q. If a tank is made in selt lands, would it be neefel? -No.
- 62. Q. What is the cost of a well P-The average cost of a well for one kos is not more than Rs. 1,009.

# WITNESS No. 20 .- MR. MANIBHAT KHANDURHAI, Patel, Amboli Taluka.

7/-Maniblai.

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1 Q. (The President.) (Through an interpreter.)-You are a Patel ?-Yes, of Ambeti taluka io the Surat district.

- 2. Q. Are you a land-holder ?-Yes. 3. Q. How many acres do you own?-About 50 acres.
- 4. Q. Did you suffer much from famine in your village? -Only the juari diel; the other craps were successful.
- 5. Q. Was there any loss of life !- No.
- 6. Q How are the crops grown: have you any irrigation there !- We have wells in the village.
  - 7. Q. How many wells?-About 70.
- 8. Q. What is the area of your rillage?-About 1,800
- 9. Q. How much of the village is irrigated? About 109 nerre, bugazel.
- 10. Q. Then, you have 70 wells to 100 acres? Yes. Only goraf lands and jaray it lands are irrigated; dry-crup lands are not irrigated.
- 11. Q. During the famine year how much land was irrigated?—About 10) acres.
- 12. Q. You did not irrigate more? There was rice on the rice lands.
- 13. Q. How did that rice fare? -- It all dried up, Int some kieri lands were irrigated, and the rice crop on them was successful. They got about a 4-anna crop.
- 14. Q. (Mr. Ibbetson.)—They were Irrigated from wells:—Yes.
- 15. Q. (The President.)—All the rice failed?—Yes, but in some kiner lands will nater une capl and so some sice was raised-a 4.anna crop.
- 16. Q. Why did they not irrigate more?-The sugar-cane had to be considered. After a rice crop, sugar-cane cannot be raised for two years.
- 17. Q. (Mr. Rajaratna Mdlr.) Was no water available for fodder crips ! - All the sugar-cane is under wells, and the wells could not be utilized for that crop
- 18. Q. A well can only irrigate an acce and a half?- Yes, of sugar-cane, but three acres of dry crop land can be irrigaled.
- 19. Q. They did not irrigate other crops?—All the land was occupied by sugar-cane, and so there was no land for dry orops. The water was entirely utilized in irrigating sugnr-caue.
- 20. Q. If there was water enough in times of famine, would they not utilize the water to mise fodder crops in addition to sugar-caue?—They had rhough of fodder in the taluku, and so they did not raise it.
- 21. Q. (Mr. Rhelson.)—Do you think that fear of enhanced assessment prevented people from making more wells!— Yes.
- 22. Q. What makes you think so?-The cultivators are afraid of increased charges.
  - 23. Q. On account of the wells?-Yes.
- 21. Q. Have you many tanks in your village?-Four tanks, large and small.

- 25. Q. How much land is irrigated from them? Sout 60 neres
  - 26. Q. Are they in good repair P-No, they are not.
- 27. Q. If they were put into good repair, how much land would they irrigate? A bout 100 acres.
  - 29. Q. Double the persont area?-Yes.
- 29. Q. Would the people like to see them put into repair?-Yes.
- 30. Q. Supposing that, for the extra 100 per cent, the people had to pay the wrt accessment, would they still like to see them repaired?—Yes, if water was available, the people would pay for it.
- 3). Q. You say that the people would object to the plan by which Government should make wells, and thou charge wet assessment on the land; why should they object?—The people are already assessed a sub-soil rate, and if they are charged an additional rate of Rs. 12 per kes it would be enry hard on them.
- 32. Q. Do you think Government can make wells as chought as the people themselves?—If wells are wanted, the people can make them themselves; they did it in famine times.
- 33. Q. [Mr. Rajavatna Maltr.)—The .70 wells you referred to, are they brightion wells?—Yes, there is also an irrigation tank, but this year there is no water in it.
- 3t. Q. Arn many of them old wells !-About 30 or 40 are new wells.
- 35. Q. When were these 40 old wells constructed !- Befare the original Surrey -about 50 or 60 years ago.
- 36. Q. What was the recomment at the original survey on these wells !-- An average of Rs. 5 per acre, Lugayet.
- 37. Q. What was the organisment under the revision of certalement?—Re. 15 and Rs. 5 per acre on kharif lands.
- 38. Q. From an average of R. 5 to unaverage of Rs. 15?—At present the inter are Rs. 15 to Rs. 16 per acre under tanks, and for land under wells Rs. 4 to Rs. 6 per acre.
- 39. Q. I am not referring to tanks?—Wells are Rs. 4 to Rs. 5. At the time of the original survey, the assessment was Rs. 5 to Rs. 6 per agre, and at the revision survey, they were from its. 4 to Rs. 5.
- 40. Q. So there has been a reduction !—The total assessment on the whole village remains the same as at the original surrey; there was some reduction in some fields and increase in others.
- 41. Q. (Mr. Muir-Mackenzie.)-Were any new wells made in the familie year of 1899!-Four new wells were constructed.
- 12. Q. Are they all being used now?-Yes, they are all being used.
- 43. Q. Where did the money come from?-The people spent it out of their own pockets.
- 44. Q. How much did they cost them?-Total cost of coch was from Rs. 200 to Rs. 300.
  - 45. Q. Were they pakka or kachcha?-Pakka.
  - 46. Q. Of how many kos ?-Of one kos coch.

WITHER No. 80 .- Mr. Sulbmanii Carrunii, Patel of Kuranjia, Mandvi Taluka.

Answers to printed questions.

1. I am now 50 years and have been all my life a culti-Mr. S. Cassumji. vator.

A .- General.

9 Dec. 01. 3. (1) Yes. (2) Insufficient.

(3) Insufficient.
(4) Yes, suitable.
(5) Yes.

- (6) There are alone right or ten vallages in the whole taluba in which from two to loar men are capable of taking the alvantage.
- (7) Tes.
- 4. Noze.
- 5 No.
- 6. 30

## D -Tante.

- 23. (1) No natural Con-
  - (2) by cutting canals and by suplas.
  - (0) (a) April, May.
  - (2) November end.
  - (c) Kere.
- 26. Yes, to save the crep when water fails.
- 30 For tanks irrigating more than 20 acres Government contribute 10 per cent, while the cillagers pay 10 per cent. Very few tanks are repaired in this manner.

### E.-Walle.

- \$1. (1) 45 to 60 feet.
- (2) By spring as dipercolation. All wells which have dried up were supplied by percolation.

No, but owing to successive erasous of short rainfall they liero lecome salue nor.

- 13) Ra. 700 to Re 800.
- (4) About 100 year-.
- (5) By los.
- 1. Q. (The President.)-(Through an interpreter).-You are a Patel i-Xev.
  - 2 O. And also a land owner !- Yes
- 3. Q. How much land do you own?-Lighty acres in British territory.
- 4. Q. Hare you any irrigation works in your village? New wells were sunk during the famine year from talasi adrinces.
- 5. Q. What is the area of your village?-About 2,100 actes.
- C. Q. How many new well- were made !- Six.
- 7. Q. Were there may wells before that ?- They were drinking wells, not irrigation wells; the latter are also useful for druding purposes.
- S. Q. Have you any tanke! Yes, six, of which three are intigation tauks.
- 9. Q. What area of crop is raised under these !- About 70 miren of rice.
- 10 Q. In a village of 2.100 acres, that gives a very small area of irrigation i Only some rice lands are irrigated; nothing clos.
- 11. Q. Do you think the village would be lest improved by a sking note wells or more tanks?—More tanks; wells are not precisable in the village.
- 12. Q. Why me they not practicable? Water does not extrerelly enough from the springs.
- 18. Q. Are the wills very deep?-You cannot go doen deeper than thirty or forty lats.
- 11 Q. Alle. Muir-Markenrie) In there work ?- No me more a troy leading guies sand.
- 18. Q. (Me. Rieton)—Leis elepta had?—Ver; ne vivit poderp becrees el tie quiek ered.
- 16 Q. Did your villege suffer very much during the last four rel-Yes, very much
- 17 Q. Ponculation of any sites enitable for making the totals in the village?—Yis; there are sites available 11, 17 . 4: 14.0.
- In Q. Would you like to see the system of tanks .;--Yo.
- 12. (1. If you reply to the written quarti me sen any statist perplose greented from dipping we'ledy the lear of children's testion out; why did you say that?—I do not say so
- go of father are their and of entared reservent harpattern are tables are unter new well-find are no at a 2-2 their are given

- (6) Ore to S acres.
  (7) One to S acres per annum.

Mr S. Carreer. p Dec. 01.

- 39 No. Where the stone blashing when childs is found, it is necessary to build.
  - 29. No.
- 40. No. It will go a great may to assist the cultivators to construct Locksha wells.

# Remarks.

- 1. The claracter of the onl is girst, Iles, and leave. There is no demand for water. The crop which tequires irrication is rice. It requires watering three or four times during the season about the middle of July, and thereafter if there be no rain up to O-tober.
- 2. Plack soil also requires water in kisri londs grown with rice. Small tanks constructed in such a ill hold water. If the tank is dug till the goranni soil is found. Say if the 6 free are dug. High catthen dams can be made of it without mesoury core walls. During average rainfall black soil will require water. There has been a desire for irrigation works on the part of owners of block soil and the construction of tanks is remarkative.
- S. Nameney should be spent from the District Bard's funds on tarel inightion. It is not the practice for Government to vicourage the covernation of arch works by leans to District Bards. Local responsibilities should not be enforced in this connection. Such works are of given value as concerning village water-supplies for men and cattle. calilo.
- 4. The construction of new wells be encouraged. No experiments have been tried to deepen wells as none can
  - Artesian wells should be encouraged.
- 21. Q. Why do ron think that the well linds will not be necessed? No wells are practicable and there is no large yet, therefore, there should be no assessment.
  - 22. Q. You have made six new wells? Yes.
- 23. Q. How do you know that there will be no enlarge-ment of assessment f-Government may increase the assessment ment on new nella.
- 24. Q. As a matter of fact have Government made any promise unt to do so! I am not aware of any promise
- - 26. Q. The others?-They have to be rejaired.
- 27. Q. When were these two tanks replired? In 1890, during the famine,
- 28. Q. If the other tanks are repaired, would the cultivators trigate more land?—If they are all repaired, more fand would le irrigated. It would be advantageous.
- 29. Q. Would the people be ready to pay extra assessment on that land?—Yes, they would be willing to do en.
- 20. Q. You say that you do not appeare of Government making wells in private lands and charging on the land; why do you say that?—If Government make these wells and ige on the fard, then the neighbours will take advantage of the wells without being el arged any rate.
- 31. Q. Supp sing, instead of advancing takavi, Governthe cultivators charged wet assessment, would they like that are in cement, or would they prefer to take takari?— They would prefer to sink a well at their own cest.
- 12 Q. (Mr. Muir-Mood entir)—Why nould they profes that F-They would not fille to incur node'it; said so would rather do it it their own cost.
- Sr. Q. They vouil ret take talarl under they expeli-
- it Q. Supposing Government polities the wills at it of angel accessors, there would be no delt?—They would be at, if Government did not let other money look.
- 13. Q. Surpour a Controvent to have named back as it of the lastices with They would like that.
- 17 Q. fick miel arrest enthantlyen behaltig to 12 f-Set i contact to upoel .
- If Q How many cores well & A'r infigure f-

Mr. Syed Gulam Husein.

WITNESS No. 31-MR. SAYAD GULAM HUSEIN GULAM MODIUDIN.

## Answers to printed questions.

Dec. 01.

- 1. The area of Ankleshwar Tuluka is 85,747 acres and 32 gunthus.
  - 2. The onliurable lund is 76.952 acres and 8 gunthas.
- 3. In the following years land below mentioned was irriented:

Yenr.	Aere.	Gnnth	15.
1898-99	. 67		Tank water.
11	. 302	212	Well water.
1809-1900	. 696	32	1)
1900-1901	. 1	11	Tank water.
	. 154	29	Woll water.

- 4. There are three kinds of land in Anbleshwar Taluka;
  - 1. Black soil.
  - 2. Yellow soil.
  - 3. Black and yellow mixed called Besar (Gabhania).
- 5. Gain from cultivation much depends on irrigation. When the rain is cauty the cultivation entirely depends on irrigation. If the min is sufficient throughout the four months then only the onlineable lands do not require addi.

- tional water. Rice, sugarcane, wheat, tobacco, vegetables, etc., require much water.
- In Gujarat there being no irrigation work people entirely depend on rala water.
- 6. In this part sufficient outturn from cultivation can be obtained if the rainfall is 30 to 40 inches.
- 7. If 4 or 5 inches of rain falls in the beginning of October or before the end of September there would remain no need for min for the rabi crop.
- 8. If the rain is senuty wheat and Juari crops require to be watered. Sugarcano and other Bugayet orops always require water.
- 9-10. This answer requires to be dealt with at great length, but in short 1 state my opinion that every vegetable and Ragayet orop requires water 20 to 25 times, and that is to be given at least at the interval of eight days.
- 11. The water rate is merged into the assessment, and therefore no separato figures are given. tienerally water ante is olurged at Rs. 6 per Bhingha. This rate is recovered whether there be no crops mised in the field.
- I shall state other information besides what is given above orally before the Coronission.
- Q. (The President through an You belong to Ank'o war in the Broach dietrict?-Yes.
  - 2. You are a land- weer there?-I am an Inamiar.
- 3. Q. How much lead do you own?—I own 3,500 singhas including alienated and Government land.
- 4. Q Has the village been surveyed?-No.
- 5. Q. Has the village been irregated at all? In one village, Amolee, there are two or three wells which irrigate.
  - 6. Q. Is that ull? Yes.
  - 7. Q. Are there may tanks ?- No.
- S. Q. Did your district suffer very much during the last famine? -- Yes, it suffered a great deal, and large numbers of cattle died.
- 9. Q. Can you suggest anything practical to gnard against the effects of another famine? —I would suggest the construction of more cruals and tanks. The people would take advantage of them.
- 10. Q. Cannot wells be made?—Wells are not profitable; to irrigate an area with well water costs a good deal.

  11. Q. How much does it costs. To irrigate one ringha
- of land it costs Rs. 1.8 per diy.
- 12. Q. How much does a well cost F-A small well, Re. 500, and a large one, Rs. 700.
- 13. Q. Government will give you help for that. Would you take takavi? Yes, but I cannot get it. 14. Q. Why not. Did you ask for it?-I askel, but I
- did not get it.
- 15. Q. Why did you not get it?-Government did not choose to give it.
- 16. Q. Do you prefer canals or tanks !- I prefer canals to tanks.
- Where would you get canals from ? From the 17. Q. Where We Nerbudda and Tapti.
- 18. Q. What is the soil like? -- Gorat and black sul, but mostly gorat. I refer to the whole taluka, and not to my own village. Canals would be heneficial to the whole taluka.
- 19. Q. Are there any places in your teluka where you can make tanks?—Yes, sitos are available.
- 20. Q. Was any tank work done by famioe labour during the last famine?-Not in my village: in the Ankleshwar taluka two tanks were repaired, but they have not proved useful.
- 21. Q. Why not dlg wells in yoor own village?-It depends upon the wish of Government.
- 22. Q. Would you make a well if you get a takivi advance?-With great willingness.
- 28. Q. Would you make more than one well ?-I do not favour wells; I prefer tanks.
- 24. Q. Could you get money from the concar?-There nro no sowcare, and no sowcar would lend money in a famine year.
- 25. Q. (Mr. Ribelson.)—What rate of interest would they charge?—From 9 to 12 per cent.

- 26. Q. You say you do not approve of wells, but that you would like to have tacks: why is that f.—The people have to work on wells the whole day, and their whole time is occupied in irrigating half an acre.
- 27. Q. Can you grow rice in your village?-There are no rice lands.
- 29. Q. What would you irrigate from tanks?-Sugarcane, wheat, and indigo.
- 29. Q. (Mr. Rajaratna Mdlr.)—Are there good sites for tank- in your Inam village?—There are.
- 30. Q. Have you any idea of the probable cost of such a tank?—A go id tank would cost Rs. 10,000 to Rs. 15,000.
- 31. Q. Would you be prepared to make such a tank yourself if Government gave you takavif-I would accept the money, if Government would take it back in a large number of instalments.
- 32. Q. How many instalments ?-1 am not prepared to 837.
- 33. Q. (Mr. Muir-Mackenzie.)-Do you advance money to any of your tenants ?-No.
- 31. Q. Have you any water-logged Inoda in your village?-No.
- 35. Q. Have you seen any of these drains f—I have seen in Piludra and other villages.
- 36. Q. Dul that do good or harm?-It has been advantageous to the neighbouring villages.
- 37. Q. If it is extended further on, would it be advantageons to other people also?-Yes.
- SS. Q. Have you heard that the surface soil is washed away?—Yes. If water goes slowly, then the surface soil is not washed away. If it goes rapidly, then the surface soil is washed away.
- 39. Q. (Mr. Ibbetson.)-Which water-the water in the drain, or water running on the surface?-The rain water falling on the sarface.
- 10. Q. (Mr. Muir-Mackenzie.)-Where is your village, near the drain?-About a kes from the drain.
  - 41. Q. Do any tenants get bagayet lands?-Yes.
  - 42. Q. The village is not surveyed ?-No.
- 43 Q. What rout do you take from the villagers !- I charge from Rs. 4 to Rs. 6 per sere.
- 44. Q. How much do you chargo for dry crop land?—The same charge: I do not make any distinction.
- 45. Q. Do you take rent by instalments ?-No. Government charges water assessment on the land, whether it is irrigated or not, but it should charge assessment only on the actually irrigated area. There are many creeks in Ankleshwar tuluko and if dams were built we could use the water. In the ralny season these tracts are full of water, but the water flows uselessly away. If this flow could but the water flows uselessly away. If this flow could be checked and the water impounded, the cultivators wouldbe benefited thereby .
  - 46. Q. Is the water not salt ?-No.

## NINETEENTH DAY.

## Surat, 10th December 1901.

WITNESS No. 32.—Mr. J. MOLLISON, M.R.A.C., Inspector-General of Agricolture in India.

Letter from Witness to the Chief Secretary to Government, Revenue Department, Bombin, No. 21, J. M. Hove dated the 16th November 1901.

la Dec 01.

- In reference to your No. 2282, dated the 26th October 1901, Famine Department, I have the honour to offer the following remarks on extension of Irrigation throughout the Bombay Presidency.
- 2. During 11 years work in the Presidency I have gained a fairly accounte knowledge of the agricultural conditions existing in each collectorate.
- Similars existing in evan collectorate.

  3. In the fellowing. Note I refer separately to agricultural conditions and facilities for successful irrigation as they exist in (A) Gujarat, (B) the Peccan and Seuthern Makratha Country. I do not think it is necessary to include in the enquity the Konkan, Kanara or the southern talukas of the Surat District. In these trues the rainfall is geography so heavy and assured that fice is the staple crop. There has in these parts occasionally been pattial crop failure from scant rainfall, but there is much more pressure used of extended irrigation in other names of the pressing need of extended irrigation in other parts of the Presidency.
- 4. In Gujarat the soils vary considerably in character. Some of the soils can be successfully irrigated, others cannot.
- of.

  6. In considerable portions of Ahmadabid, the Punch Mahale, Kaira and is adjoining Barola territory the soil is used militaria. It varies in character from a light sandy learn to a stiff losio. These alluvial soils extend to a depth of 40 feet or more often without any change in character or consistence. The older existing wells usually hold an mafalling supply of water. The water in some wells as ever, in other brackish. Wells with sweet and brackish vater are commonly found very close together. The water from brackish nells is specially solitable for tobicco, but it may not be so salt as to be unsuabble for other crops. The initial cost in determining whether a well is likely to yield sweet or brorkels nater is small.
- The initial cost in determining whether a well is likely to yield sweet or brorkish wher is small.

  G. In these alluvial plains there is considerable scope for extension of successful irrigation from wells. Such extension would require not only large mitial outlar, but large recurrent expenditure, because the wells would be costly in construction and the parametr water forch being but the cost of taising water would be high. It is certain, however, that the average cultivator in these parts before the last families was telerably will circumstanced. The Coarotar villages of Kaira and of Rareda territors are pushely as fertile as any in India and the average knubic cultivator in them has or can provide sufficient labour and manner to do full justice to any extended scheme of well irregation. In the families year (1829-1820) the cultivators of these Charotar villages, as also generally it roughout the alluved plains of Northern (Injurat, helped by small talanci advances from theorement as themselves to dig Lichter wells in large numbers. The cost of digging through the soft selluvial and new triffing. A talanci advance of Rs. 25 or Rs. 50 was smithein for digging a well and for the leather Lag, repeated other fittings. The perpendic far sides of their Lichtin wells were very solid, and it was exceptional to ind a Lichteda well tailing in during the fairs as on. These wells were consulted after the following measure. The surface of a measure in good wells in that times.

  The many of them gave a full supply of water throughout the son, the surface of water in good wells in the times.
- 7. It is n typerit letodig lactel swills to encountilly in black and or entrailed a district, became the wells, after ner for a el art period, have a terderry to fall In-
- S. In the alluvial tract of Northern Gujarat, there are a good a key losed sing estactors which are suitable for rive. The product is to proved by artificial bands result to ri-leds, but the resultable arms by finest counter research withbods, but if existallise timely insuff secultive rays and water out antile is incare of circulation for two or three waters of trouble the sold of the event through you arises. Each initial how when of the two exists from wells, also from tacks. Greater you come may tank our wells, also from justice only in the sold receive the arms, as if i he started only in the sold of Taluka of the Raise District and in the most of allows of Africa labels.

- 9. In the wheal and cotton growing parts of Ahandabal, also in parts of the Panch Mahdis and Kaim, the still le block or mixed black. It varies considerably in depth and character. The substata also vary. Below the black soil may be found light-coloured orgillaceous layers more or less concreted with lime and consequently more or less impersions to water. There combinations of soil and substillation in the control of the c impervious to water. There combinations of soil and sub-soil when impervious are not well saited for succeedal bri-gation of the onlinear crops. In the black soil parts of Ahmadahul the rainfall is usually light. There are, how-ever, a good namy situations where rice beds a saisted by tank irrigation have been successfully formed and there is probably considerable scape for extension and for further protection either by small tanks or wells.
- 10 In the Kaira and Ahinudabal Districts there are certain salt lands existing in some places in patches, in other places in more extended areas. Wells constructed in such areas have usually brackish or salt water oscless for irrigation. After a year of drought in these salt land areas well water, which is usually elightly brackish, may become intensaly so.
- 11. Palla-built wells of ordinary depth and especits 11. Palla-built wells of collinary depth and capacity generally throughout Northern Gujarat cast Rs. 1,00 to Rs. 1,500 each and large wells capable of working foar lifts (los) much more. The deep alluvinus of Kaira and Ahmadabal, particularly it soudy in character, needs water very frequently and a single los will not Irrigate more than two arres. Gujarat wells are, however, usually capable of keeping two or more los at regolar work.
- 12. In the famine year (1899-1900), although the 12. In the famine year (1849-1900), although the general area under trigation in the Presidence declared, the well-trigated area increased by about 100,000 acres. More than three-fourths of this increase occurred in Kaira and Almadaind, although the water of many of the aid wells in the black soil parts and in selt hand rillings became too salt for irrigating crops. The rice occas were bagedy answar and the tanks throughout these districts dried up. I can from personal knowledge say that the fielder produced from well-irrigated crops throughout Northern Gujant in 1899-1990 was the means of keeping alive many of the cattle which arrigated crops throughout Actuarn tinjaint in 1832-1870 was the means of keeping alive many of the earlie which survived the feature. The value of cultivation of this hand in producing feed for men and heast, in providing useful home labour and in keeping people off relief works cannot be lightly discounted. I believe that a ratio well could, with indivadage, be constructed in every parties occupied by a karledy well in the late famino and in thousands of other furoncale positions throughout the alimital tracts of North-irn (injurat. Such wells would be ancommonly useful in an ordinary serion and in a year of drought or famine would provide water sufficient for very extensive irregation.
- would provide water sufficient for very extensive irregation.

  13. In the funine year it was possible to irrigate from a two-loc well three crops on three different areas covering nitogetter 10 or 12 sensed ground. The three encessive crops in Northern Gunarit were ordinarily Sundhia, jouar sown in September, what sown in Novemter-December and Sindhia or Chion (Panicum militorium) sown in Marcharit. The grain of Sundhia foot trivial value, but the folder is very time and mutations on a fair average crop produces about 6,000 lbs. of dry hedder per sere. A good cup of integral wheat in Uniquest full lauver 2,000 lbs of grain and 2,500 to 5,000 lbs of stay per sere, but ewing to rest wheat is a riely copy in tinjars. The lost weather cap of Statilia does not on an average yield so heavily as the estiler cup. Terre was no dearth of manner in the famine year because it was not required for dry-crop collivation. The whole supply of the year was available for well-capting the development in the famine year beauty to see the copy in the allocal left trends of the produced were correcus.
- 14 Ter regiont brossi, excepting the allusial left about the Topiand the sandal left along the count, the soil is deep black cotton seit. On such land rute he le have been are confelly four allunder village table and more could be ferroot. The solid entirely invultable for the eclibration of cities ereja under well are ratherists a tension that exists of deepard retentite of a distance and the solid sta are fracts val

- 15. The soils in the northern cotton-growing talukas of as Surat Collectorate ore more variable. There are the J. Mollison, the Surat Collectorate ore more variable. There are the rich alluvioi bhata soils which fringe the Tapti and extensively grow valuable garden crops under irrigation from shallow wells. Thronghout the district there are n number of gorden villages with considerable areas of alluvial soil somewhat similar to bhata. These grow a great variety of valuable garden crops under well irrigation. Generally, however, the soil in the northern tallukas of Suret is deep ond black and chiefly grows dry crops of cotton and jawar. In plats the soil is more mixed in character and in such places well irrigation is extending. Inclor in particular to olay loum (kali beser) soils adjacent to the alluvini lands of gardon villages. Such mixed black land has extensively been brought under well irrigation since Revisian Survey. The reasons are that the land is suitable for irrigation, the This reasons not that the man is surraine for irrigation, and occupants are men of means and non onjoy assurance of tennie at a fixed rent for a definite term of years. On this class of land there is scope for extension of irrigation—perhaps also in the Surat District on mixed black sail of heavier character, but there are cert in risks in constructing wells on such heavier land which ought to be referred to. wells on such heavier land which eight to be referred to. It is uncortain whether o well, when constructed, will yield sweet or bruckish water. Water which is sweet early in the season may turn brackish during the hot weather. Brackish water for irrigation deteriorates temporarily or permittently mixed black soil and on any soil is only suitable for certain crops. In the black soils of the northern talukas of Surat, as in Broach, more tanks for rice irrigation could with advantage has constructed. with udvantage be constructed.
  - 16. In paragraph 4 of the memorandum of points to be considered by the Irrigation Commission there is a question of nthizing the waters of the Nerbuddo, Tapti and Sibarmati. The waters of the two former tivers could only in Gujarat be diverted to irrigate black soil areas which are to were large extent quite unsuitable for irrigation. The waters of the Saharmati or my other Stream which fluor through the alluvial plains of northern Gajarnt would lee extremely useful for irrigation, provided the lands irrigable consists of light or comparatively light ulluvial sail, but if this proposed system of urrigation is carried through the low-lying black soil rabs areas of the western tallicas of hundright, it is almost certain that the results would Ahundabad, it is almost certain that the results would be unsatisfactory.
  - 17. The information given in the foregoing paragraphs in reference to the various districts of Gujarat undicate that considerable extension of irrigation is printicable. There are, however, risks which must be kept well in view.
  - 18. In parts of the Decean and of the open plains of the 18. In parts of the Decean and of the open plains of the Sathern Mahratha Country the water in the wells got so low in 1899-1900 that irrigation was intermittent. This was not the result of one sason of drought, but of several seasons of scant rainfoil. The famine year 1896-97 caused extremo drought over the greater part of the Decean, and the more open plains of the Karnanak, still in these parts, in that year the wells held sufficient water for year extensions. in that year, the wells held sufficient water for very extensive irrigation. There was then considerable arrivity in constructing new wells and in deepening old wells to increase the water-supply. Lorge portions of the Decean and the Karnatak are extremely liable to season, of drought, the Karnatak are extremely liable to scasons of drought, but it is difficult to believe that those parts will again have a succession of seasons so disastrons as those which began with the famine of 1899-97 and culminated with that of 1899-1900. During that period in places the water in the wells got so low that even drinking water became scarce. Still statistical figures show that excepting Poma and Sholanur there was in 1899-19 on considerable increase of irrigation under wells in all districts of the Decement Karnatak as compared with the year before. In these districts the tion under wells in all districts of the Decemental Armatak as compared with the yeor before. In these districts the protection afforded by wells ngainst drought is in my opinion much more satisfactory than that afforded by tanks or larger irrigation works. After years of scant minfall the tank and canal supplies fail just when the water is most required and it can be put in evidence that some at least of these larger irrigation works are not an unmixed blessing in other respects. I can call to mind agreen languistics which these larger irrigation works are not an unmixed blessing in other respects. I can call to mind several enquiries which the Bomhay Agriculturol Department was asked to institute in recent years regarding damage done to land by tank unil cansl water in causing water-logging, soft officerscence, etc. Considerable damage has been caused by Reh under the Nira Canal. The Manjri and Mandwa sugarcane area has been flooded to excess by the Klaurakwasia Canal for a number of years. A good deal of land which was formerly cultivoted has by excessive water-logging been converted into swamp and owing to unhealthy conditions produced by wetness of soil. The crops of cane now grown are not nearly so good on an average as they were 5 to 10 years

- ago. I can, if questioned by the Commission, give detailed reasons for these failures and for other failures of irrigation works throughout the Deccan ond Kainatak.
- 19. There are various reasons why irrigation from wells cannot be indiscriminately extended. The cost of roising water from n depth of 25' or 30' as in the Decean is heavy and is particularly so from the deep wells of Gajanat which range in depth from 40 to 60 foot. This cost is so great that only a good well-irrigated crap can pay. A good crop ander ordinary circumstances can only be produced if henvily manual, earefully cultivated and regularly watered. This necessarily restricts the area which can be successfully irrigated from wells to sooh situations as have at reasonable doubt lolerably certain supplies of sub-soil water in irrigated from wells to sooh situations as have at reasonnble depth lolerably certain supplies of sub-soil water in
  ordinary sensors. It also restricts the cultivation of well
  irrigated crops to cultivators in easy circumstances, to men
  who have the means or the orelit to provide sufficient
  mannal labour, sufficient mannes and sufficient work cattle.
  Perhaps it would be possible for a few years to grow on the
  very rich ulluvial soils of Gujarat successive numanured
  oraps which would pay, but such practice would cause soil
  exhausthe in a very short period in ordinary Indian soils.
  Valuable craps grown under wells tonst necessarily be
  watched by the owners. Therefore it is not likely that such
  cultivation will extend far from the village sites. cultivation will extend far from the village sites.
- 20. Irrigation from a tank or canal is cheaper than from a well, but with any system of irrigation heavy applications of manne and specially careful cultivation are necessarily required to give profitable results in average scasums. In years of absolute drought waterings as required would, however, without manner or special tiliage be extremely beneficial on such land as is suitable for irrigation.
- 21. I have stated certain circumstances which will restrict the successful extension of any system of irrigation in the presidency. In my opinion the chief restriction to this or any other agricultural improvement will be found in the large and general indobtedness of the agricultural classes to large and general indobtedness of the agricultural classes to the Banias. I see no hope of special agricultural advance-nent in the Bombay Presidency until this incubus of debt is removed. It practically purplyses every offort towards improvement. I would be prepared to recommend that forernment should once for all liquidate the debt in some fuir and reasonable way and make it impossible afterwards for the cuitivator to borrow on the security of his land. Then it would be impossible for him to waste his substance in reclass caste erromanies to the extent that he does now in uscless caste ceremonics to the extent that he does now. There is no doubt that the general outline of crops in the Bombay Presidency is in ordinary years very seriously affected by the indebtedness of the cultivators because they are not in a position to cultivate to the best advantage.
- 22. Throughout the Presidency generally the oldest well may generally be said to occupy the best positions. This indicates on behalf of the people an intimate knowledge of the most favourable conditions for successful well irrigation. In the ording uplands of the Decean and Southern Mahantha Conners (oxeluding the red laterite sails in the Mahrntha Country (oxcluding the Deccan and Southern Wahrntha Country (oxcluding the red laterite soils in the west of Belgaum and Dharnar), it may be definitely said that the most favourable positions for wells ore the bottom lands consisting of mixed black soil 18" to 4' deep overlying murum with nuchanged trap still lower down. These substrates are pervious to water and scenare natoral drainage—very important considerations when land is continuously irrigated. There are throughout the Deccan and Southern Mahrstan Country were appearant stinations where wells can Mahmha Country very numerous situations where wells em still with greet advantage bs constructed. Fringing the most important rivers of the Deceau and Southern Mahratha Country, such as the Tapti in Khandesh, the Godaveri in Ahmellangar, the Krishan in the Southern Mahratha Country the soil is deep black. It gets sedden and wet in the mea-soon. It is extremely retentive of moisture. It is not pervious and therefore like the deep black soil of Brucch is unsuitable for growing irrigated crops. Such lands are specially suitable for dry rabi crops.
- 23. The best wells in the Decenn and Southern Mahrstha Country keep two or more motes (leather bag lifts) netively at work in ordinary years. A single mote will from a good well of moderate depth irrigate 3\(\frac{1}{2}\) to 4 ocres of such crops as require light irrigation, e.g., wheat, onious, and 2 or 2\(\frac{1}{2}\) acres of such crops as require much water, c.g.; sugarcane.
- 24. In the 1899-1900 famine year the area under well irrigation in the Presidency was considerably extended through takavi advances for constructions of kachcha wells and for deopening and requiring old wells. These advances were not so serviceable in the Deceau and Southern Mahratha Country as in Gajorat. Special officers were employed to deal with applications for takavi, but could not complete all

sopphies in the Persan and Southern Malatatha Country someoneith to make the aleaner service tide. It takes so continue to so ke well through find trap in the Persan. In a familie year the natural to be not if an usual and so the coston a lean on gots lower that the day. Rath irrigated copie can only be sown recombly during a cottain persol. It is therefore practically necless in a familie from the takes if a neils execut for despiting after Surember-Desember Desember. Dewniler.

- 25. It may be inferred from the last paragraph that I advocate the area of liberal fadacia iranees in ordinary years attent than in famine years for well construction. Unlimitary enquiry which must take time is necessary before traces no be given safely for wells. This enquiry can only properly to make by experienced practical mee. A man with sufficient knowledge of all the circumstances connected with successful extendion of well-irrigation would have so difficulty in disposing of numerous applications in a short time. He could take district by district, and to begin with streetion absances only to tol tabiy well-2-do califoraters and by preference refer the more lastourable positions, and experienced practical man with an indimate anowledge of native character if put on special duly would in a single season be able to dispose of mony applications if he took up district by district in a systematic way and thoroughly exploited each. He would be handerigated in his work in an intellerable way it loans when contented are not promptly poid in full. Such loans would be more freely taken by the propelie the present 0 per cent, rate of internat was lower. In the currently indicate that the latiture system is unpopular become controlled to a one extent by subcredinate decrement utilicials who for personal gain make a substantial deduction from evolution.
- 26. Complaints see wale that successful applicants for 23, comparing are unit tunimized in the manner con-templated by Government. If it can be proved beyond question that loans given for nell constructionare generally misupplied, then I think Government should undertake the minipplied, then I think to remains should undertake the construction of wells in the same way as any other irrigation work. A cultivator can construct a well cheaper and probably as well as by dovernment agency, and it is probably irreferable that he should have off undertake the work, but it may be found necessary to employ Government agency. In that case I urgo that the occupant of the land should have the option to exit all material and with its family do all diaging and rough work requiring ordinary labour. The value of such work as ordinary hirug more to defend from the total quilay, the difference should be labore. The value of such work at ordinary airing in et to be deducted from the total outlay, the difference should be a burden on the land recoverable like assessment principal and interest to be repayable in easy instalments spical over a long term of years. Government should bear all loss if the well fails to provide a full supply of good water at a real nable dipth in a year of average sainfall.
- 27. Under existing conditions the administration of the 27. Under cristing conditions the administration of the statured speces, the agricultural development of the Hambay freeidency, and the general efficiency of the Revenue Service are greatly landered, because the men employed in the Subordinate Revenue Service are not properly trained to their nort. This will some in part be tennedied. As bearing on carting inclining a part the following note before the Farmer Commission, which I do not wish to modify in

any de rice -

"28. I feel strongly that the Bombar Sub rdinate Biretime Street would be considerably streage that differential more extensively by national traffic trained men. The rules recolating the work of Circle Inspectors, District Inspectors as all Supering adents of Lend Records and Agriculture electric contemplate that such officers abouth investigation and active work, it is clearly full down that Once Inspectors will watch the easy in their enclosued decide activity automatic and active most trap fail we are lamped on a westly national for an entire and full and their proof that the rules and decide an easily not the respector with and englished and expense to english and expense of an englished activities and expense of the street of polished and englished and their content in some I are an electric englished the elements of area and activities of expenses of a reasonable suffered englished and englished and englished englished englished and englished englished englished englished englished and englished en ASSESSOR Y

- The District important and Superinterlents of Mr.

  Leaf Recapts and Agriculture exercisms superior J. Methods, shock in the work of Circo Inspection, bitalistical and other rounds are passed for the visible Inspection, it is at frough Philadel Inspection, Mandadam, Andatart Collectors and Collectors to the Inspection of Iraal Recaptand Agriculture, for consolitation. Compîtalian,
- compilation.

  30 It is, I this k, evitain that approximate a currary in agricultural ordinational values refuse returns can only be as used if any relief to agriculturally trained men. At present its Circle Irapeters in the Bouteur Prailience, who do the post reliside work, are, I helief, and Error men, who, owing to the winding up of the anyon, have been compulsorite retural. Itsen that department. They were truncal in that department to active outdoor work and to approve in a plactical way agricultural facts and operations, and as Circle Inspectors, such training that learn found valuable.
- found saluable.

  "31. It is unlikely that agreed meally trained mea will needly Circle Imperiors posts of Re 25 perus as muches they can be coloured pronocion and good with reas in time to be Manuadata. I do not suggest the needs ty of special promotion for any agreed trained meal. At the salue time there can be little doubt that such mean as show special appliede and reliablences at work would have more or less of a tion on such posts as District Inspectors. Price Inspectors, Superimendents of freed Records and Agriculture, and in responsible pasts in the Department of fand Recards and Agriculture. The clerical and superiment establishments controlled in his own office and on Garcinnent forms by the imputy Director of Agriculture should be restricted from agriculturally trained mean shore prospects of promotion should not be infector to the prospects of promotion should not be infector to the prospects of mean who join the Rorenne service. join the florence service.
- should not be inferior to the prospects of men who join the Revenue syrthe.

  "32. It is necessary to explain the term "grieval medical trained". The Romany University gives a degree in agriculture. The sollable has recently been revised and the past test suffered. In order to gain the degree a thorough procure in out-duor or field knowledge is more fally as escential to the student as book or class-moon harning. The course extends over three years. A student must past the Provious Uzammation, which is a higher test than Matriculation, before he can enter the agricultural course in the College of science, Point Tais prelliminary test is the second for students who group for other University examinations. The first before he can past to the strain must past three University examinations. The first before he can past to the strain science, the second before he can past to the third year's course, the shird in order to get the degree. The practical training can adequately be given at the Poons Gavernment Farm (on which are rendentled quarters for students) and by seconsions. As far as possible object become plots are arranged annotally, to fundinairo students with numerous fell and graren cope of the Presidency and the contituous under which they are successfully grown, and farrier to ellustrate, practically in the field, the class-room teaching. There is a complete collection of indigenous agricultural in plements at the farm and an excellent numerum edicated and agricultural and equipment at the College of Science are sufficient.
- sufficient.

  "33 The Bombay Government has roled that in future Agricultural degree-believe shall get a bioresions must be because Society to precisely the same footing as other University degree-believe. The effect has bom that the agricultural closes at the College of Science have revised. They had described to a single student 1840. Further pointed in 1840, and I understant that IS new students along it foot the month (factory 1904). Postar well be a course of twining for other processes well as hemdly and furge the med of a present along reparting the employment of the three to all great research particularly in

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- the Department of Land Records and Agriculturs. In the latter Department, even in Bombay, the prespects of graduates in agriculture are indefinite.
- "34. I advocate strongly that Bombay Civilians, after they are, say, a year and a half in the country, be sent to the Deputy Director of Agriculture during the mensoon in Poona for two menths to be taught semething regarding the crops, the limplements, the seils, the cattle and generally regarding the agricultural conditions of the Presidency. I am sure they would find such teaching valuable afterwards in ordinary district routine work."
- 35. It is impossible to state, except in general terms, the increase of produce obtained by the various systems of irrigation throughout the Presidency. The conditions vary extremely between districts as regards the kinds and value of crops, which can be successfully grown, as regards available supplies of manure, as regards the adequacy or precariousness of mater-supply and as regards netual cost of applying irrigation; therefore the question of profits can only be generalised. I am prepared to discuss orally the conditions as they exist in the various districts of the Presidency.
- 36. It can be put in evidence that the supply of water in existing wells has been considerably improved he years of drooght by deepening and by bering in various parts of the Presidency. The Agricoltural Department is, I believe, collecting detailed information. The evidence at hand clearly indicates that owners of existing wells might be helped considerably if proper boring apparatus was made available in the various districts. The rude hering apparatus now in use can only be successfully employed when the substrata are comparatively soft and free from layers of fine sharp sand.
- 37. Reference has already been made in this note to the necessity of extra sopplies of manure for any extended scheme of irrigation. The important question is: "Are such supplies precarable?" It may be answered in the affirmative. There is ovidence at hand that when manure is urgently needed for irrigated crops supplies which are
- ordinarily at hand and not generally used for dry crops, are eagerly in demand for irrigated crops. I can from personal knowledge, state that in every district where well irrigation is extensively practised that the dang and urlae of cattle, litter, leaves, tank mud and other useful organic coatter, household waste and in some out-districts night-soil, are collected with scrupulous cars and are much better coaserved than hefore there was extension of well-irrigation. In the neighbourhood of some large towns poodrotte is freely used for irrigated crops. It is dear where there is great demand, and cheap where the domand is limited. The extension of the important market garden cultivation in the neighbourhood of Surat has been dependent upon supplies of town manure, chiefly endely made pendectte. The stuff is still sold at a cleap rate because applies are yet more than sufficient for requirements. The Bombay Agricultural Departmental experiments with sugarcane at Manjri near Poona have proved that certain elibbe cakes which can be procured in large quantity at cheap rates give better results than the macure cakes in ordinary use. These manure cakes (caster and karanj cakes) are dear because largely in demand for irrigated crops. The cane cultivaters have recognized the epsenal value of the edible cakes referred to, and are now using them in the Poona District as manure for sugarcane. The practice of growing San (Crotolaria juncia) and other legaminous crops, as green manures, will become more common as well-irrigation extende. Everywhere in the Presidency the system is already recognized as a very useful
- I do not think that the cultivators of irrigated crops in the Presidency require to be taught anything regarding the value of rotation as a substitute to some extent for manure. Under canal irrigation probably sugarcane and some other crops are taken too often in sneecesion, but usually under well-irrigation a remarkable knowledge of scientific rotation of crops is shown.
- 38. I have found it convenient to give information regarding the various questions put by the Irrigation Commission in narrative form. I hope I am not out of order in doing so.
- 1. Q. The President.—You have been 11 years in this Presidency, I understand?—Yea, I was first Superintendent of Farms and then Deputy Director of Agriculture in Bombay and now hold a Government of India post.
- 2. Q. Are these farms your creation?—The Surat and Manjri farms are; the Poons farm existed before I came to the country; it has been extended a good deal since to carry on special experiments and special work.
- 3. Q. You say in parograph 5 of your note that the initial cost in deterioining whether a well is likely to yield sweet or brackish water, is small?—Tes, it is trilling in Gujarat but serious in the Decean. In Gujarat you have to dig through comparatively soft soil before you get to the water-bearing stratum; in the Decean you would have to dig first through soft materials and afterwards through hard maram and thap rock, causing great expense. The actual stone or brickwork building is not so expensive in the Decean as in Gujarat because the hard trap takes the place of actual building to some extent in Docan wells. Sometimes a Decean well is only built up in the side on which the leather bag works.
- 4. Q. Supposing an ordinary cultivator wishes to place a well near his villags, how does he set about finding whether the water is salt or sweat?—There would be no great risk in the Deceam, because salt water is rarely met with; in Gujarat there is grave risk in some tracts of getting brackish water, he cannot make certaio, he must do the kachcha work.
- 5. Q. Do you recommend getting boring instruments in each District of a superior kind and a mechanic to work them for the sake of giving this information to the people? I should like to test that plan before it is applied extensively, I should not like to do it wholesale.
- 6. Q. Natives have boring instruments of some sort?— Yes, but they are not applied to initial work, but ln existing wells to despon them and find a lower stratum of water.
- 7. Q. There is no doubt that by the use of Norton's tubes one could find this out?—Yes, specially in Gujarat where it is easy to work in the soit alluvial soil and subsoil.

- 8. Q. We have had a proposition that it would be a good thing to have at each of the District head-quarters being apparatus which could be lent?—Yes, it would be a good thing.
- 9. Q. You eay in paragraph 6, talking of the kachcha wolls "these wells were of course usoless after the following mouseon" and again in paragraph 7 "it is not possible to dig kachcha wells so seconstully in black soil or mixed black soil tracts, because the wells after use for a short period have a tendency to fall in "?—Kachcha wells in allavial soil last until heavy monsoon rains becsen the sides, then they have a tendency to fall in. Kachcha wells in chatta soil on the banks of the Nerbudda and Tapti are dog at a trilling cost every year; the depth to water is sometimes only 12 to 13 feet. The silt of flood water fills most of these wells up anunally.
- 10. Q. (Mr. Ibbetson.)—Have you any tracts in which a kachcha well would last five or six years t—Yes, in parts of the Panch Mahals and in the black soil ports of Ahmadabad, also generally in the Decean kachcha wells would last for some years; the cost of making them pakka would not be great and therefore, there would be no particular advantage in leaving them kachcha ler any length of time.
- 11. Q. (The President.)—Is there may rice irrigation to speak of on wells?—Not much on wells alone, but there is the risk of a tank failing towards the end of the season, and the owner of the crop would be glud to have a well at hand.
- 12. Q. (Mr.; Muir. Mackenzie.)—Do they use wells for rice?—Yes, they do, only us an auxiliary to tank irrigation; if n tank fails rather than lose the crop they would irrigate from wells.
- 13. Q. (The President.)—Do you attach much importance to the extension of tank irrigation and the repair and maintenance of tanks?—Yes, a good deal of importance particularly if the tanks are small and if the people of each village centrol the distribution of water from their own tank; I would consider an extension of small tanks thus used much more important than the extension of large tank irrigation which could not be equally well controlled by village communities.

- 14. Q. Still the water lasts longer in a big tank? I have on bug tanks in the Discoun where the disaltrantages outweigh the airaniage you refer to.
- reign the arrainace you reter to.

  15. Q. Of course the ire of the twiks must depend upon the configoration of the ground?—Qulie so, not so much in tinjuist, because it is a comparatively level tract. In almost any position you could make a tank if you could get a little flow of water, because the depth of black soil is such that you could remove a foot of the surface soil without location the fertility.
- 16 Q. I suppres you would count upon cultivating the bel of the tank when the water is off?—As a matter of fact this is not an ancommon practice in the Presidency.
  - this is not an uncommon practice in the Presidency.

    17. Q. You say in paragraph 11 "the deep alluvium of Kuira and Ahmalahal, particularly if sandy in character, needs water very frequently, and a single loss will not irripate more than 2 acros." And again in paragraph 13 "in the famine year it was possible to irrighte from a two-loss well three crops on three different areas covering allogether 10 or 12 across of ground." I suppose a double-los well would do twice as much work as a single one?—Yes, if the lead is near, each Kor would, if the water hats, irrigate 6 across hetween Spiembor and the following May. Three crops, each accupying 2 acros, would be taken in succession on different atters commanded by the same well.

    18. Q. Would that he a Kor working day and night?—
- 18. Q. Would that be a Now working day and night ?— Yes, but only towards the end of the season, but not necessarily between September and February.
- 10. Q. Did the level of water in the wells sink much in 19. Q. Did the level of water in the wells sink much in the famine?—In the famme yest one season's drought did not materially lower the depth of water in the older and better wells in the deep showing tract of Kaira and Ahmalabad and the Panch Mahals.
- 10 Q. (Mr. Mair-Mackenzie).—Do you say that from personal observation?—Yes, one year's drought does not diminish the supply until the following hot weather, in the allowing tract. In the black soil the supply did fail.
- the allarvial tract. In the black soil the supply did fail.

  21. Q. (The President).—You say in paragraph 12" tha fodder produced from well-arrigated crops throughout northern (injuret in 1890-1900 was the means of keeping aliverang of the exitle which survived the famine;" what happened to the exitle where there was no well-irrigation f—They mostly died. We have in the Hombay Presidency 4 mills n less eathle than there was in 1843-97, the traffic in lindes in diajurat and adjoining Natire States in the famine year indicated that the chief less which countril that year occurred in these parts. Our census, which was taken in June, indicated than nearly 70 per cent, of the Kaira, Ahmalabad and Panch Alufuls eathed died and that is, I consider, an underestimate, probably lefore the raise came more cattle died. The change from dry fielder to green lood at that particular serion is so were that it is the cases of mortality in any year and was grobubly the cases of great mortality in the funito year with the cattle sere muca reduced in condition.

  22. Q. You say in paragraph 14 "throughout Broach
- with the caths were much resuced in condition.

  22. Q. You say in paragraph 14 "throughout Broach campling the alberth bett along the Tapti and the sandy belt at me the coast, the soil is deep black cotten soil. On such land rice bids have been succe-fully formed and irrigated by cillage tanks and more could be formed. The soil is entirely unsuitable for the cultivation of ether crops.". Is the still upon the allurial traits sitable for Irrigation F— In is well prefected by irrigation from shallow wells now.
- 24, Q. Her wide is this belt?-Not u mile wide; the hyrboids belt is wider.
- 124. Q. Worll the allurial tract on the Nerbudda be ledeling a could led in term narrow. A could would do to tarm. I think a surroy should be made. I am not very a time to such that the whole trach. I should say the varent is such that it is not worth whole to construct a cared a could be a construct a cared a cared and the construct a cared a cared a care of a construct a which are dug every year, or on higher lank by place and which are dug every year, or on higher lank by place and a construct a cared and a construct a cared and a construct a cared a construct a cared and a construct a cared a ca 24. Q. Would the alluvial tract on the Nerbudda
- 21. Q. Hara you seen anything of the pumps for raising series in a myers? I know a little about them but 1 121
- 21. G. le l'is exercin e cling into segre l'eref.-At Naveste, l'Esche bisto territory, e man interde to d'en figil- in 1,21 vig.
- 27. Q. Do yea led are in it in-Yea, if the coil is rollable.
- 2. A. W. Chi should responsed—Pred in expression; and it is the source of the four halos or principle exceeds a first of the four halos of principles and defined an expedit printless any defined an expedit printless any defined an expedit printless and defined and defined an expedit printless and defined an expedit printless and defined and defined an expedit printless and defined and defined an expedit printless and defined and defined an expedit printless and defined and defined an expedit printless and defined an expedit printless and defined an expedit printless and defined an expedit printless and defined and defined an expedit printless and defin

- 29. Q. I understand that you think on thick will rice Me, can be striggted with a transport-Yes, by means of small J. Mellis tacks.
- SO. Q. Could it be irrigated by a coual f—Not with a learning of a may part of tinjural, because such irrigation would spail mare land than would be under size. By lest-age from the canal, I should expect water-legicing and salt efforce water, and I also think that the people would get use canal water so economically as well as tank water for rice.
- 31. Q. The question is whether rou can utilize the water of these rivers ar should you allow it in go in the sea?—I should be sony to see a large scheme tried in either lireach or Surat; I would rather see its water wated than used there; I should espect that a good deal of land would go out of cultivation and that a good deal of land wend be spoiled.
- SS. Q. Water-logging can be remedied by draluage f-Sill you have the extra capense of drains, the chances are that open drains would want to be chared every year. They would be filled up with black soil. That has been our experience on the Sorat farm.
- experience on the Surat farm.

  33. Q. Still It is just a matter of mency with your I should be very sorry to see a canal carried where we have black soil, especially for rice cultivation; pure black soil is absolutely unsuitable for any irrigated crop except rice. Deep black soil, as you find it senerally in timigrat and in practically the whole of Bronch, holds when wet a large quantity of water and the sub-soils are of clay-like character and therefore inspersions to unisture; when you have that combination, the conditions are such that no irrigated capp can be successfully grown except rice. There are in the Surat District restricted areas of soil which is irrigated has soil of this class. We have found that the value of the caps grown under well irrigation these not warrant the expenditure incurred for deep wells, heavy dressings of manure and drainage. No ordinary cultivator would have incurred the expenditure to exquire into the means
- 33. Q. Our particular object is to enquire into the means of protection against famine; it is a serious responsibility to reject two large rivers?—I can only say that according to my convinced helist enoal irrigation for rice in the black soil parts of Gujarat will do no good. It will probably do harm and I should be sorry to accept the ricks. The case is entirely different in respect of the allurial soils of Northern Gujarat and of Barod's territory.
- 35. Q. Have you seen the irrigation in the Madras deltas i-No.
- Mr. Rajaratna Mdlr.-The soil there is not trun
- 36. Q. Do you know the Tapti district !- Yes.
- 37. Q. What is the soil like?—The soil throughout \$7. Q. What is the soil like?—The soil throughout that in Broach, then you get into uplands where the black cotton soil is 3 feet deep or less overlying murain. On the black soil along the Tapli it is only possible to grow ruli crop, because the soil give as sodden that in Mary crop will grow. In this river-side tract rabi dry composit wheat grain, and lineed are taken in rotation. Khaudesh is a Mary district except in this belt.

  38. Q. (Persident)—I understand that while deep least
- 38. Q. (President)—I understand that while down here in Brosch and Sorat there is a belt of alluvist soil which stands irrigation, further up the river-side belt consists of deep black soilt—Yes.
- 3P. Q. Is it asle to irrigate on goraf land ?-Yes, perfeetly sife.
- 40. Q. Do you know unrthing of the proposed irrigation works of the Salarmati ?—Na.
  - 41. Q. Hare you seen the Hathmatif-No.
  - 42. Q. Nor the Kinel cuts f-No.
- 43. Q. Have been pureled how it is that in this country there is very little transition bestoned on coltent; in Frynt it is a ligity impact copy, why is that full ground cotton differs in variety from any lodigenous ladien mainly; that may be one reston.
- 41. Q. It is not impossible to irrigate critica in this matrix !- If a may goes to for intention at all, he selects country full a may goes in for injection at all, he selects copy which will pay better than cotton, anch as parden ere; •.
- 45. Q. In Egyphyon could not possibly graw ention without a part deal of intigations—in Tayle you are dealing with allowed a ll, in the Bouley President the course if is chiefly blat, but which does not write in the

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- J. Mollison. hat it cannot possibly do without it?—That country has very little rainfall, Broach has a rainfall of over 40 inches, I should say that the circumstances are such that you require irrigation in Egypt but not here, with the rainfall that is
  - 47. Q. Do tanks ever get brackish?—Not in my experience, but I caunot speak positively.
  - 48. Q. You say in paragraph 17, "the information given in the foregoing paragraphs in reference to the various districts of Gujarat indicates that considerable extension af irrigation is practicable; there are, however, risks which must be kept well in view." To what do you specially allude ?-To the risk of getting salt water in the wells for
  - 49. Q Have you had any exporience of the effects of drainage on water-logged land?—No, I should like to try the experiment. In one taluka of Sarat a good deal of land has gone out of cultivation owing to the affect of waterland has gone ont in comparison owing to the sirect of water-logging. In this water-logged area the orops are not so valuables and more risky to grow than those on drier land; people have been compelled to grow rabi orops instead of kharf. I don't see any reason why, by drainage or other improvements, land that has get out of cultivation should not be successfully brought under cultivation again.
    - 50. Q. What is the talaka you spoke of ? Olpad.
  - 51. Q. Can one buy artificial manure here and is it within the range of the cultivator's parse?—Oil-cakes and other indigenous maunres can be honght,
  - 52. Q. Dues it pay to buy them ?—Yes, we have made experiments with sugar-cane which prove that certain edible cakes which are not used as mannro are more effective than nanure cakes in ordinary use and can be bought at cheaper market rates. People do not generally know that these edible cakes are valuable as manure. Oil cakes can easily be broken up into powder for use as monure under the mill stone which is used in every village for making mortar.
  - 53. Q. Do you believe that, generally, throaghout the country it would pay the cultivators to use oil cakes and other indigenous coacontrated manures?—Yes; certainly for irrigated crops.
  - 54. Q. Are oil oakes manufactured largely?—Yes, in every village, the oil 18 used as food, the cakes are used as food for milk and work cattle locally and are experted also They can be stored for any ordinary length of time as cattle food.
  - 55. Q. There is no want of them in the country?-If there was a large extension of well irrigation. I have no doubt these cakes would got dearer, but we have also san the use of which as green maaure could be extended.
  - 56. Q. (Mr. Ibbetson).—You mean the yellow pea which we call sanai in Northern India? With us san is n mallow?—Yee, Mr. Faller told use that the cultivatore in Central India object to grow this crop on account of caste prejadice, but there is nothing of this in the Bombay Presidency. In various parts of the Presidency when the need of mannre arises the cultivators save up night
  - 57. Q. (Mr. Muir-Mackenzie).—Would it pay to use oil-cake manure on cotton crops?—No.
    - 58. Q. Cotton orope grow well after san? Yes.
    - 59. Q. The practice of using san is not common ?-No.
  - 60. Q. (The President.)—Taking all these things into account, what do you think would be the most indicious course for the Government to take to fortify the country against the bad effects of another famine?—I would extend wells in every snitable position, provided it was certain that all the manner required would be available, that all the hullook and mannal labour necessary could be commended and that the men who owned these wells had sufficient capital on credit to do full justice to the work.
  - 61. Q. These are important conditions, I suppose it follows that well irrigation in any tract would never rise to 20 per cont. of the tract?—If it rises to 10 per cent. I should be glad.
  - 62. Q. That is the best that can be offered ?—In Gnjarat on black soil the extension of small tunks for rice would be extremely important. I see that Mr. Mehta thought that they could not be extended in Broach hocause of the difficulty of labour. I think if the occasion areas that labour would he forthcoming. On the black soil which fringes the Tapti in Khaadesh, where linseed, gram, etc., are grown, the question has been solved, as many hill people from the

- Ghats come down periodically in order to help in the reaping of the crop. I should say that labouring people would he attracted if the work existed.
- 63. Q. (Mr. Higham).—You don't think that the abjection to the extension of irrigation without manner would occur?—Na, I think the manure will be available in reasonable amounts.
- 64. Q. If canal irrigation is introduced on as large an area as 34,000 acres, will manuro be available; you are only epeaking of well irrigation?—Yes, I refer particularly to eufficiency of manuro for well irrigation and hy emall tanks. This is the only description of irrigation I recommend for Chrismet. Gujarat.
- 65. Q. The canal irrigation might rnn ahead of that sapply of manner ?—Yes, there are other serious drawbseks to that, I anticipate the soil being speiled by canal irrigstion.
- 66. Q. Not in all osees?—No, in the Mutha canal irrigated tract of the Poona District manure in sufficient amount is a a lable. The effect of canal irrigation has been that a good deal of the land has already gone out of oulti-vation on necount of water-logging. To my knowledge the crops that are produced in that part new are not nearly so good as they were five vears ago on account of the land being now surcharged with water. The soil is a medium black soil with murain.
- 67. Q. Has not drainage been tried there ?-No, there is no combination between the people who occupy the land, one occupant cares little for the interests of another and the canal irrigation is doing a good deal of harm.
- 63. Q. I suppose from your Poons experience, you think cannal irrigation should not be contemplated in any part of Gujarat?—Not in any part of the black soil of Gujarat. In the alluvial soils it would be useful if the water is regularly distributed and if manure in sufficient quantity is available. I would expect more harm than good by making causes in the black soil part of Ahmadabad. Thowells become periodi-cally salt in the talukus west of Ahmadabad.—If the pro-posed Sabarmati canal passess through these parts salt efforcedness will increase. I have seen a good deal of land which has already gons out, of only increase a account, of which has already gons out of oultivation on account of salt officrescence in these parts.
- 69. Q. (The President).—It has never been drained?—No, I doubt if it would be possible to drain it. The country is very flat and very wet in the rains.
- 70. Q. (Mr. Higham).—In regard to the Brosol District which is, I think, all strong black soil, do you consider that two oultivation in these parts where they have tanks, is more profitable than growing cotton and junri !-- No doubt it is, but then the expenses are more than on dry orope.
- 71. Q. The profits of cultivators on rice would not be greater than growing cotton and junri?—They would, I think, be usually greater, the rice crop would be safer provided it got, late in the season, two or three wateringe in a year of average rainfull.
- 72. Q. I understand on the whole there is greater chance of the outton crop failing than there is of rice, if you have proper tanks ?—Yes, certainly.
- 73. Q. The tanke make it more secure ?-Yes; in Broach and Surat where there is generally too much rain for cotton.
- 74. Q. But not otherwise more profitable to the cultivator?

  —A good crop of tice irrigated from a tank properly manured is worth Rs. 80 to Rs. 100 por acre, an average crop of cotton is not worth more than Rs. 25 to Rs. 30.
- 75. Q. Do you think Government would be juetlied in making tanks or in belping in their construction in the District of Broach ?—Yes, provided they are small and provided cach village controls its own tanks and each community is made responsible for repairs and clearing ac required.
- 76. Q. If more than one village controlled a tank what do you fear ?—Two villages might perhaps pall well togother.
- 77. Q. And in the case of a large tank P-I want to see the people hang together in such a meaner that they would ahealntely control the water, and that every owner of a rics bed gots a fair share of it.
- 78. Q. There is not much scope for extending tanks in reach because the country is so flat?—Still you can improve the position by digging out your rice beds, the depth of the soil in Broach is such that you can afford to dig a foot or two and impound rain water; I should say there is very great scope for that in Broach.
- 79. Q. Would fodder be henefited by irrigation?-Not in ordinary years. In a famino year whon fodder is required free cultiva or who grows garden crops under a well changes

his practice and gr. or folder crops instead, because it page

Sit Q. Ordinatily the cattle Lore are led on grave folder for Xea, also or Larde, stran of all certain and these to tradeer; there is a large growth of grave in the Thana levels, the Dhangs of Sorat and in the ference of the Tapti Valley, but much of it is so infinite in quality that it does not pay to transperi it nee diegetee.

St. Q. Wi ere is the good grass sent to 7—In Northern Gujarat there are very large areas which produce excellent grass. This grass new, to a large extent, goes to waste because the leads of cuttle which graced these lands are dead and no particular transportation takes place. A small quantity of the grass is taken to Pombay. A great deal more transportation could be done.

\$2. Q. There are apple waste lands for the growth of folder?—Yes, ample in Northern Cuprest.

83, Q. It is not necessary to increase the area?-No.

Si. Q. What is the amount of folder that you require to give a pair of fullocks for six monthed—A full grown bulled world sat in the cause of the dry 15 points of grow. On that grown has been world not exactly on account of its innutritions at turn; there should be an addition of 11 to 2 points of oil cake, that would be the amount for stall size if Gujerati bulled:

85. Q. That is for a finjerati bullock, I suppose a smaller hallock would not eat so much !- No.

66. Q. What would be the cost of storing the grass, do you suppose, locally !—On the Charoli l'arm would almostated where no have 600 local of cattle we put up in the year after the famine sufficient to make it certain that the year after the famine sufficient to make it certain that there would be about a full year's apply always in hand; it at cost us at ordinary rates Re. I for 1,300 bundles of ent grave collected in me herp; 1,500 bundles more pratically equivalent to 1,000 jounds of grass; entiting, tring and streams root us Re. I. I got two hand presses from the Forest Department, so that we could press this grass into compute failes. I also got whose which had been previously made. I. The baling cost about Re. I per thousand pounds, in that the total of terms to Re. 2 per thousand pounds, in that the total of terms to Re. 2 per thousand pounds, in would be impossible to keep bales grass safely through the redirary ramfull unless it was protected by corregated from elects. We get up the big Dutch learn using rammar way it has very easy to slow away sufficient supply for the rails for supports and corruptated from for roof, in that way it has very easy to stor away sufficient supply for the eath on the farm. If it pays to do that on a small scale it would pay to do it on a large scale. I advocate storage on a large scale in the Western talkas of Ahmadshad. Lahout scares and if the stuff is kept until the following rains it could be a blat a profit if the rains are farourable.

57. Q. What is the supply at this farm, have you a supply for 12 months:—There is more than a six months supply.

50. Q. However proples for any disposition to preserve folder in that was ?—No, I have not so a singlifyed the kind among ordinary agriculturies; they trust to the average autium form atalog hards being sufficient.

St. Q. You say this grass goes to warte in Northern Comment in there may market for it f-Yes, a certain account, but the stuff is so bully that even in present bulletings we the rulemy better to entry more encounted stuff.

pr. Q. Would have to end it to Doubly !-time in with in Printer of from his 10 to Rs. 11 per thousand rounds and that is inferior to what is produced in Gujurat.

former and the interior to what is produced in Gujurd.

(Mr. History).—Hefore crass using my examinate in,
I should like, as one of the Resonne Mend woll that
Co. mission, to them, you, Mr. Molles in, for your valuable paper; it is, I then him of them, it interesting and
is towning papers which has not then had before us.

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The Q. Beather's the modification after small tanks in the life and only in a summer of the after tanks.

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Po you think that, if s'uless are provided for the distribution of water, the people would lead to distribute the J. Medica, unter by means of small tanks with less injury to their own in different think so. I win call to mind one particular 10 Dec. 01, tank in the Dharmar District where much darage was den by water-longing.

VS. Q. On a carel in Northern Irdie that I know very well, exactly the same thing happened; water was given profusely, and we bal thousands at acres thrown out of cultivafacely, and we but themesade all acres thrown out of cultiva-tion by mater-legging and sait effectivence. Of late years the canal authorities have restricted the empire of water of each village by giving them pipes of dimensions no calcu-lated as to give just enough water for the land they have to irricate; that restriction, combined with distingue and the realignment of the canal, has removed the end of mater-logging entirely and is gradually reviewing the effort-whee. Do you think among the epople in Proma a similar restric-tion of water could be effected feel should like to see at tailed; there is great room for improvement in the distri-bution of water.

26. Q. I understand your fear is that the people would re-distribute the water fairly !—Yes, and another difficulty !-thatche supply lances, a nelative, ! lance also the December not personal; if there are mealificient Ordober rains the chances are that water will fail when it is not wanted; if you put on the restriction that you make, it might be that the dieds near the canal would get a full supply and others madeble result not. probably would not.

97. Q. Would not the effect of restricting the supply materially be to increase the amount of water, that is, to economies the water and so render the supply less liable to fail?—There is no doubt that a great deal of water goes lo waste now owing to the intermittent system on which it is given and the beggar-my-neighbour system on which it is taken.

98. Q If you restricted the supply and made them economies the water, would it not last longer?—It you were dealing with a village community that might answer; but in the case I refer to the land has gone out of the hands of the community into the hands of speculators and contractors in Peona; these men sub-let it to others; it is very difficult to make the cultivators co-operate in the same may as in an onlinary village community.

onimary village community.

193. Q. Satting aside the contractors for the moment, you seem to have doubts whether you can get the people to distribute their water fairly. If you anticipate that didiculty, on what grounds do you advocte small tanks;—Hecuse you are dealing with one village. Each man would take good care to get a fair share, if the same thing could be done with the restricted supply of a causal, you would have the same result as with one tank.

100 Q. You think if the restricted supply were given to seek rillage separately, there would be no difficulty i-None.

101. Q. My fear is that precisely the same difficulties that you think would arise in the case of large tanks would seem in the case of small tanks ?—I don't Illink so.

103. Q. (Mr. Mair-Marlencie).—Are not the conditions of Poons somewhat poculiar?—Yes, no doubt.

103. Q (Mr. Pbeteen) - What you say applies only to P news - Yes.

101. Q. It would not apply to, say, a causi near Alimadabad?—No

103. Q. I don't quite understurd your point about irrica-tion to black soil; it no black soil, not ray, cannot be irrigated, except for rice. You said you had about ned a miset soil take exceptly at your farm t—There is a description of black soil in the Surat distinct known as Kali Herre that can be irright I with alrantage. It has a prema subsoil. On the Government farm we went to very great expense for wells, manore, drainings; the lighter soil is better snited to paid in a direction.

10°. Q. Istlenea description of Idael, soft that can be fire and with performing in Sant of the not pure the soft, at is allowed to be a fixed to a proceeding underseated, that or it beaten is somethef principal in.

107. Q. (Mr. Mair: Macientel.—On the form were have believed in edge which have done nery well f—At the same time well and no nerv great expense as a gardy hardle at least on the construction of with

In a Quality Plater - To return to this lighter likely and with me as eath of a renget was begins in the take in that is that foul or above parts of Gryant sollings or carbon times and are a same with the distribution of the thomas distribution and South on Gryant, it shapes let thomas distribution and South on Gryant, it shapes lets in the

J. Mollison.

Deceau and Kathinwar. Provided the soil is thick enough, it is suited for tank irrigation from which there is not the same danger of sult as in well irrigation.

- 109. Q. Whore that seil exists in Gujorat there is donger of ealt ?—Yes.
- 110. Q. Is the areo under it considerable?—Yes, very considerable.
  - 111. Q. Salt would render well irrigation risky ?-Yee.
- 112. Q. Now, returning to the subject of the extension of well irrigation, you say you would be very lucky if you got 10 per cent. of the tract irrigated by wells P—Yes.
- 113. Q. Do you mean 10 per cent. of the whele district or of the area suitable for well irrigation?—Probably 90 per cent. of the Decean is unenitable for well irrigation, 10 psr cent. in a district like Khaira, where the whole truet is suitable for well irrigation, would not be too low.
- 114. Q. Supposing that in Gujarat as o whole you had wells wherever it was advantageous to have them; what portion of Gujarat do you think would be irrigated P—I should not like to commit myself.
- 115. Q. Cortainly much less than one-tenth !-Yes, except Kaira.
- 116. Q. In Knira what would be the meximum that yeu could irrigate from wells ?—I doubt if you could go heyond 10 per cent. on account of the deficiency of the manure.
- 117. Q. You could not have, say, 55 per cent. us in the Punjab?—No, count most he taken of the cost of raising water from deep wells and the need for heavy dressing of monure to make the crops really good and really profitable.
- 118. Q. To take another proposition. Take the kachcha wells that were made in the famine; you say that pakka wells might be made in place of each of them; suppose Government could make these wells pakka by a stroke of the pan, could they at once he used to advantage?—le the manure and inhour sufficient?—I should not like to do it in one year. I chould like to proceed gradually; the manere and lobour would be provided gradually or required.
- 119. Q. The number of wells is steadily increasing in Gujarat year by year, are they not?—I have not the figures, but should imagine there is no doubt of it.
- 120. Q. Do you think the increase in the number of wells is obout as great as the increase in manure and of lahour would allow of heing worked profitably?—No, the increase might be much quicker, but of course there is a limit.
- 121. Q. Po you think there might be a further increase without outrunning the supply of manure and of labour ?—Yes.
- 122. Q Do you think Government should bnild wells?—No, it would be better if the cultivators could be got to do it, making it absolutely certain, that if he means to harrew from Government he will get the whole of the money required.
- 123. Q. The best thing would be to give oultivators all the facilities possible for borrowing ?—Yes.
- 124. Q. Can you snggest anything more?—I think it would help materially, if a oultivator constructed a well (it does not matter whether he borrowed the money or builds it out of his own funds), if a premium were put on each aere that is brought under cultivation in the first year, say from October to March, provided that the water got was eweet and therefore enitable for good grains.
- 125. Q. What sort of premium?—I should not besitate to say Rs. 25 per acre for the first year, that would be shout Rs. 200 for a well.
- 126. Q. The well would cost about Rs. 1,000 or 1,500 ?—Yes.
- 127. Q. Would not that Rs. 200 be thrown away in the case of a mnn who was going to make a well in any onse P—No, he would do more justice to his land and give it more manure, and therefore get good profitable crops at once.
- 128. Q. Ahout smoll tanks, take the case of the repairs that have to be done annully; I have asked many witnesses who know the people well whether they have any hope of getting the people to do these repairs, and the opinion has been overwhelming that practically it is hopeless?—Why?
- 129. Q. Want of combination has been mentioned as one of the reasons?—It could be done more economically by the recole
- 130. Q. I agree that it is the best thing if it is possible, but witnesses tell me it is not ?—I don't ngree with thut. I think the repairs should be done by the people. They should be compelled to do them. At the same time there is

- some risk in clearing out a touk annually; it would held loss woter.
- 131. Q. Why should Government go to the expense of repairing these email tanks. Holf a dozen men would do the work for themselves?—They have no money; besides they have to pay enhanced land revenue, etc.
- 192. Q. As regards the propesal to store hay, how long would it keep if stored ?—An indefinite period if properly huled ond protected.
- 183. Q. You say that the morket price of hay is never lose than Rs 10 to Rs. 11 per thousand pounds in Bombay?
  —Yee.
- 131. Q. What would it east to eend it to Bembay?—I helievo as regarde the Tramway Company that after paying all expenses of baling, etc., in an ordinary year (and they pay for right of cutting grass a good deal more than the Government assessment), it costs thom somewhere between Rs. 8 and Rs. 9 per thousand pounds landed in Bemhay; that emount includes everything; that was my information three or four years ago.
- 135. Q. You say in paragraph 12 "in the famine year (1899-1900) although the general area under irrigation in the Presidency declined, the well-irrigated area increased by chout 100,000 ecres." That was because of the kacheha wells that were added?—Yes.
- 136. Q. To what extent is that land manured?—The monured oreo in Kaira and Ahmadobad is obout 75,000 acres.
- 137. Q. At what season of the year is the mannre opplied?

  —You say the mannre was to spure from dry cultivation owing to the failure of the rains?—In Gnjarat manure is not put into the soil until after the first fall of rain. Tank mud is spread on the surface before the rain, but not firm manure.
- 138. Q. (IIr. Rajaratna Mdlr.).—You referred to the difficulty of precuring manure?—I believe I stated that there are possibilities of promning considerable quantities of manure for any extension of irrigation.
- 139. Q. What are the possibilities?—In certain well irrigated tracts in the Deccan, the necessity for more manure has become evident to the people themselves, and they save up materials which formerly were not used, not as night-soil, household waste, litter and even cattle urine; there are besides other sources of manure that have not yet been fully exploited, such as oil-cakes and green manure.
- 140. Q. Do yeu think the rayats will be able to solve these difficulties?—Yes. In Poone we began to use manures other than the ordinary. For instance we used cotton seed as manure for sugar-cane, and the effects were such es to justify the belief that it would pay the ordinary cultivator to use it; we also used cortain edible cakes that can be obtained at cheaper rates than castor and karanj; those edible oil-cakes con in some Decean Districts be hought at 70 lbs. per rupse; they are richer in nitrogen, etc., than those usually used; they ore not so dear, weight for weight, as the ordinary manure cakes, and me more voluable as manure; chew the people experimentally that these edible cakes are useful and they will use them. We showed their effect in the district and the result is that many oultivators use edible cake who formerly used ordinary cake.
- 141. Q. Are leaves of trees used os manuro here?—No; except in the Kauara District; but san is sometimes ploughed in before plonting sugar-cane and other garden crops. (Guvar, n pulse) is similarly used extensively in Gujarat.
  - 142. Q. Have leaves been tried in the farms !- No.
- 143. Q. Havo you seen the new reservoir constructed of Broach during the famine ?—No.
- 144. Q. There is a large extent of land lying fallow in this Presidency in every district, is that reserved for grazing purposes ?—Yee, in parts of Breach and Surat ordinary dry crop black soil often lies waste for several yeors and grows grass. When broken up and cleaned, the oreps of cotton and juar grown subsequently are uncommonly good for several years.
- 145. Q. (Mr. Muir-Mackenzie).—In regard to fallow we find that in the Sunt District the area cropped is about 480,000 ocres and the fallow land measures about 270,000 acre. In ordinary years is the lotter not more than you would expect?—What are the figures for Brooch?
- Q. Mr Ibbetson. The cropped area of Brouch is 564,000 and fullow 90,000 ceres.
- Witness.—I should expect the real fallow aren to be more in Broach than in the Surat District. Grass lands are prohably included in both d stricts, but the areo of grass waste

in Sarat (which is not necessarily empositable) is greater than in Brosch. A very common tractice in the Broach district is to leave certain land fallow. These lands are fallowed and cleaned in a very thorough way and an increased crop of cuton in the following year is obtained.

140. Q. (Mr. Mrie-MacIenziel — In Ahmedehad there decled the figures:—1,678,000 rupped are and 4,04,000 fallow f—i have no dockt that the follow area includes a good deal of grass land in AhmaJakad.

147. Q. You meen land kept by occuping in his holding ander grassi-Yes, but not necessirily unprofitable

149. Q. In Breach district, we have heard of cotton and rice being grown together !- Yes.

149. Q. Are you familiar with this mixed ctop?—It is a practice common in Broach to grow cotton and rice mixed. It is done simply as a safeguard in ordinary years. If the rainfall is moderate cotton thives; if the rain is very heavy there will be a good crop of rice. The rice is grown mixed in the rows of cotton or in an intermediate raw by itself. raw ly itself.

160. Q. If canal irrigation were applied within the colon area for rice, would a profitable or p of rice he grown f—No, the rice grown with cotton is a special variety which suits the ordinary dry crop system of cultivation. With canal irrigation rice be be would be necessary and a variety, and let be true application and regular irrigation, would be score. be grown.

151. Q. You allade in paragraph 6 of your note to considerable scope for extension of brigation by wells in the alladia plana of Gujarat. For what crops do people take water?—For garden crops in ardinary years; for foddor, mari and food-grain crops in a year of scarcity.

162 Q. They meald not in ordinary years take water for ordinary food crops?—No.

153. Q. Would the difference in yield not be sufficient to par f-It might pay expenses, but east of irrigation is very high and the garden crops pay best.

151. Q. In a district wear the sea, where the cost of carri-age modified is considerable, would imposed manure be of any use to extend the manutial supply?—No, an account of the e st compared with available indigenous supplies.

165. Q. When the indigenous sopply becomes dearer?-

150. Q. Manritius wee large imports of gunna, etc., for engagement—Yes, on account of the scarcity of the independent shiply. We are in a different position in Bombay. We expert loace and oil-cakes. The latterespecially would be kept in the cruatry if there was any particular need of manue for extension of brighted crops.

manusc for extension of irrigated crops.

107. Q. Da yau think with the available supplies of minute the lext crops are grown?—In India, in the best erganizate dustriets the value of the crops thus produced postably accords that of the best crops in Mauritine. We have in the Poina district time after time produced crops, yielding 12,000 Hz. of gur per acre, sometimes with 15. 1,000 per acre. In some dustriets well-trigated garden compare often worth 15. 4.00 to 600 per acre. Toose figures indicate that with available supplies of manusc, soil and water can be turned to the v.ry test advantage.

138. Q. If the supplies of indigenous manuras become its elicient and get dear, would the grower of case and garden crops use imported manures?—I suppose so, but at process I see no need of importing any description of man-

150. Q. You have grown sugarcage, have you not, with in pited manute, on the experimental farmed -No.

1.0 Q. Not nitrate of sodal-The crude nitre used is a per duct of the country.

Int. Q. that you think it signable to make an experi-

16.2. Q. Provilly not in the Provincy, but in other parts of india !— Nowlete in India would request a cannot be ordinal for colonialy agreement order at the rotes at militative can be imported, and I do not expert that they exact with

It is, the large execution the Hemographe Mr. Lely to a point of the form handed a well- more very despitable to place. That is the principle. In the Hana Harrage expecting his place is mercues knowledge wells which proceedings in the figure of the first of the fir

10% Q. The results were not different in different tracted d'an attact exterminal attempt the District-of North-to-secistat in the familie year but in the parts I she the receive were good.

163. Q. In the tracts that you saw there was no difference?—No. It would, towever, be easier in a district closed J. Mellison in by fonces like Knira for local effects to find out differences of this sort. I can only say that I saw numerous 10 Dec. of. Lacketa wells and the results were surprisingly good.

160. Q. I understant from Mr. Lagan, Collector of Breach, that a considerable number of Lacketa wells due in the famine were not read this year F.—Kacketa wells in the black cutton soil of lirowh go out of use in a year, because they fall in. I saw lacketa wells in the bel of the Nerbudda in the famine year trigating years. In ordinary years the chief crops grown under them is tobacco. These Nerbudda Lacketa wells are due every year.

There Newbodok lackeds wells are ding every year.

107. Q. (Mr. Heteron).—I understand lackeds wells never last beaund the next monscont.—Kuckeds wells in alluvial soil fall in partially at least after the first monscon rain. A lackeds well in the Decean with trap-nock below may last fer years. It is alvisable, however, that it should be made parlie. In the alluvial soil of longrant the labout expended on a lackeds well is penerally lest if the cer ipant intends afterwards to inske a parlie well. The diameter required for a parlie well is necessarily greater and it would be to there to excivate for a parlie well in in place near the lackeds well than to extend the diameter of the kinkeds well. The below in digging a lackeds well in the libers is not lost because the sub-strata are hard and rocky.

163. Q. (Mr. Muir-Maclenzie). Have the Lackels wells of the Decran, which were due in the famine been kept in neel-I have seen Lackela wells dry ha the Decran and therefore not usel, but if Lackela wells contained sweet water and the soil commoded was suitable for irrigation, I would be surprised if during recent years they were not fully usel.

169. Q. It would not be advisable to give money for constructing wells to cultivature who were not enterprising !-No.

170 Q. Therefore it would not do very much good to give much money to the backward people in the Paach Mahale?-No.

171. Q In paragraph 8 you observe that rainfall is usually insufficient for rice. Would you say that it fails as often as two years out of five t—My experience is that it least certainly done so more frequently than that in the last five years in parts of Gujarat, especially Alumadahad.

172. Q. You say the assessment is a fairly high one: How do you account for the people being able to pay it in spite of its being high?—The seasons during the last five years were very unusual.

173 Q. In ordinary scarons it would fail in two years out of five?—In those parts of Northern Gujarat where rice is grown and the average rainfall is light, and there is no porticular protection from tanks or other source of irrigation. there is certainly a very poor crop or almost total falture of rice two years out of five.

171. Q. How do you account for their being able to pay assessment? —I do not think there is any great difference of assessment between rice fields and dry-crop lands in the particular areas I refer to. Dry crops during recent years have been grown in some rice heds and many rice heds he row waste. The occupants could not possibly have paid assessment out of profits on these rice lands during the last three

175. Q. I understand you to say that there are plenty of sites likely to be available for small tanker—Xes.

176. Q From what have you derived that impression f-

177. Q Do you know this part of the country f---

178. Q. Supposing y a have small tanks, how would you prove it - lity digging mee beds underneath the tanks.

170 Q. By digging out rice bels underneath the tanks you would feeline originion by flow, but you would not store the wife drawing from the exterment?—Not if you wide the lank too high you will swamp as much land above it or you will trijecte below it.

180 Q. Now what would be the effect of this additional "it'r :--Tre anall table would give prode it earre's of weer there waterings in aldition to the ordinary rainfall, and then for moteral of basis gravery midding precations on p they we did have n good one

183. Q How would see assertain the sites of the tark-t-Wly not ord risks surreys.

Mr. 182. Q. You would like to see surveys undertaken P-J. Mollison. Most decidedly as regards tanks.

- 10 Dec. 01.
- 183. Q. Can many more new sites be found?—Yes; and if you put the matter in the hand of a practical man, he could complete his survey probably in one season.
  - 184. Q. Would you prefer to extend and improve the existing tanks ?- There is room for closering a great many of them out certainly.
  - 185. Q. And onlarging them?-I think that a survey should first be undertaken. It is very difficult to give an opinion on a broad question of this sort.
  - 186. Q. Do you think it would be a good thing to encourage the digging of rice beds in black soil by granting takavi?

    —Yes, because with manure, labour and a good position, a very good crop could be growa.
  - 187. Q. Do you think it would be a safeguard against the ordinary fluctuations of rainfall?—Yes, I think so. I think that it would be safer than the cotton crop.
  - 188. Q. Have you seen the Hansot reclamation scheme?—No.
  - 169. Q. They throw a low bund round a large area of land; the object is to allow the rain water to sweeten tho land?—The same practice is followed on tidal creek land further down the coast to exclude sea water. If water at high tides is excluded, the embanked had is gradually sweetoned by the rain.
  - 190. Q. We have been told that brackish water is very often usefully and for barley ?-And also for wheat.
  - 191. Q. The brackish water grows better crops of barley than are grown by sweet water?—Yes, probably.
  - 192. Q. That crop can stand brackish water?—Slight brackishness does not hurt wheat or barley, but really brackish water is specially useful for tobacco only.
  - 193. Q. A number of questions have been asked as to the number of crops and the number of acros irrigated by a single kes. Do you think that a single kes would irrigate six acros?—Yes, if the figure applied to successive crops taken in the irrigating senson and the water lasts through-ont the senson. Three crops can be grown in succession on different areas in the alluvial soil of Gujanat: one kee will irrigate a greator area of mixed black soil than of gorad.
  - 194. Q. Do you think famine labour could be employed to advantage in digging kachcha well. !—I would rather give an advance of Rs. 25 or Rs. 30 and let the cultivator do the work himself.
  - 195. Q. Do you not think a good many famino labourers could be employed at this sort of work?—Yes, probably, but to the work in the particular way he wants it done. If done by himself he would arrange the excavated carth to level his field, to make the slope, and genorally to prepare the field for irrigation. He would, moreover, dig the woll in the position he knows instinctively would be best for his land, and the people he would employ, his relatives and ordinary servants, would be kept off relief works for the time being.
  - 196. Q. Do you think wells constructed by famine labour would be used?—If the occupants of the land dug the wells themselves they would be more likely to be used.
  - 197. Q. With reference to the extension of irrigation by kachcha wells in Ahmadabad and Kaira in the famine year, do you think Government would be well advised to make all these kachcha wells into pakka wells?—Yes, gradually, if the occupants cannot be induced to construct the pakka wells themselves.
  - 198. Q., (Mr. Ibbetson).—If the occupants cannot be duced?—The Government should undertake the construcinduced ?tion, but the people themselves can do the work cheaper.
  - 199. Q. (Mr. Muir-Mackenzie) .- Do you think it would be satisfactory for Government to construct wells ?-- I should rather see the occupants doing such work themselves.
  - 200. Q. Supposing the work of constructing the wells is not proceeding with sufficient rapidity, then you would have the Government stop in ?—I would prefer to try all possible means to encourage the people to do the work themselves.
  - 201. Q. Such wells would be uncommonly useful in ordinary seasons?—Yes.
  - 202. Q. There would be considerable extension of irrigated crops !- Yes.
  - 203. Q. You say there was no scarcity of manure for well irrigated crop, in the famine year in Gujarat. Had not there been a considerable dry crop area sown and the usual application of manure to that area?—Kharif areas were

- sown and manured, but there is also no doubt that the irrigated patches got a full supply of maunre.
- 204. Q. Moro than usual ?-Yes, because more was available.
- 205. Q. You have not seen much of water-logged area.?-No, except in the ceutral part of Olpad.
- 206. Q. Could these water-logged areas be under suitable for rice by drawing flood water into tanks and growing rice under these tanks?—Your suggestion is, I think, a very good one, and I should like to see the experiment thoroughly
- 207. Q. In paragraph 15 of your note you refer to the land being brought under well irrigation since the Revisiou Survey in the Khed Talukn?—You, I saw a number of new wells being constructed and used soon after Revision Survey which was made 10 years ago.
- 208. Q. Why have they used the wells since the Revision Survey and not before?—They were afraid of enhancement of assessment, especially as regards the well-irrigated areas.
- 209. Q. They did not knew that no enhancement was proposed F-I do not thick they did; at any rate they apparently adopted the safe course of waiting in order to see what would happen.
- 210. Q. Do you think that they understand it now ?-I think they do to some extent.
- think they do to some extent.

  211. Q. Woold you prefer permanent exemption of callanoement of assessment on wells or exemption for a term of, say, forty years?—I would prefer permanent exemption in a district well provided with railway and good market communications and where rates are now high.

  212. Q. Do you think the cultivator, who was offered exemption for forty years, would be deterred from digging a well by fear of subsequent enhancement?—No, I do not think so. I think he would have a good deal of scope to recoup himself and repuy any debt he has incurred.
- 213. Q. You say that the removal of a foot or so permanently from the deep soil of Broach improves the position for rice beds and does not lower the fertility of the land. for rice beds and does not lower the fertility of the land. I have been told by the people that the washing away of surface soil by drains spoils the creded areas?—That is quite likely. The weathering effect of sun on the black soil in the hot weather prepares a favourable seed bed. I've drains wash away this favourable seed bed with the first fall of rains. Of course the raw soil then exposed is not a favourable seed bed. I propose the removal of surface soil for rice beds once for all and the favourable weathering action goes on annually afterwards. weathering action goes on annually afterwards.
- 214. Q. You say there are various reasons why well irrigation caused be in discriminately extended; and that it must be resleicted to certain areas where suitable sub-soil conditions exist. Would you take no steps to ascertain that beforehand?—I would have a survey and put the work in the hands of a practical man who would do a good deal by eye inspection?
- 215. Q. Would you like to see the data collected by the Survey Department, especially on points of level and as regards the quality of the water to be made use of?—Such data will help the Surveyor materially.
- 216. Q. How soon would you begin in a famino year to advance takavi for kachcha wells !—In September or Octo-
  - 217. Q. The second-half of September?-Yes.
- 218. Q. Do you know anything of the experiments conducted by Mr. That of Bombay in regard to horing in his Navsari laud 9—No, I don't, but I do know that borings in several wells in the Surat District resulted in tapping water at a lower level and that the water thus got rose in the wells and increased the supply very considerably.
- 219. Q. Is it necessary to have expensive tools for that purpose; would the country-made tools not do?-That is a question for an Engineer to answer.
- 220. Q. What happened in the boring trials which recently were tried at the Sarat Farm with country-made tools?—In one well the results were very satisfactory, in another smaller well the trial was unsuccessful. A layer of sand was met with, and it was found impossible to serew the borer through this sand. With better apparatus the trial would prohably have been successful. I do not know whether better apparatus could locally be made or not.
- 221. Q. You had a considerable amount of success with your imperfect apparatus ?-Yes, certainly.
- 222. Q. Do you think it is possible to educate people in the storage of manure particularly in the conserving of

urine?—They do not know much about it row; but if the necessity areas for monoring an brigated crop, the necessary amount of manure will be forth coming.

- 223. Q. They save wine?—To a certain extent, but the force of cuttle shale are not likely to be generally public forcel and drained, and this is the only way to race all
- 221. Q. In the famine of 1829 there was a terrible folder 231. Q. In the famine of 10.2 thete was a termine to der famine and no grass was previously stored; do you think it is alreadle to employ famine labour in storing grass?—
  I suggested that course to the Commissioner, Northern livision, as I to the Collector of Ahme labod, but nothing was done. If the work 1st been moderable its grass, which was assistable in large quantities, could easily have been sold at a protet in Bomber.
- 225. Q. Is greated and to any extent anywhere in the President; Nowhere that I know of except in Homeley and in Military Contonments and by contractors, and such stacks are often proposely burnt to raise prices.
- 226. Q. Would the lealing of a canal into tracts not alterater favorable for not inigation, be of value in ancetening the well- and increasing the amount of mater-supply in the will?—Yes: the mater level in the existing wells in the Pount Detri ; is much high r than it used to be but this is an accomposiment to make of canal mater and mater begins a personal mater. and mater-logging on low-lying near.
- 227. Q. Hare you found that the tanks have the effect of sweetening the water of wells in their vicinity?—I have not observed it.
- 228, Q. I find you estimate the average yield of the wheat in Ahmalahal to be 1700 lbs, per nere for irrigated land and 560 lbs, finto unirrigated P—Yes.
- 223. Q. Would the irrigated crop get more manure than be unirrigated?—Unirrigated crops got no manure at all the unirrigated ?practically.
- 2.10 Q. It is used more extensively for irrigated than rulerigated traps?—Yes In Northern Gujarat a well brigated whest crop, if well menured, may yield 2,000 to 3,000 its per acre of grain, but there is considerable risk of
  - 231. Q. I find that in Ahme hagns we had in-

1595-1536 . 67,000 acres irrigated from wells, 1897-1897 . 120,000 ... 1897-1900 . 101,000 ...

Do son think the 101.0's acres would be kept up !- The area will be kept up and extend with a return to years of munes reinfall. In the last four years the rainfall has been deferent. It is certain that we seem as the wells contain a good supply of water the unitation will increase.

202 Q. In Poora yes had in-

1495-1896 . 65,000 acres uniquied from wells, . 61.00 .. . 60.000 ... 1594-1607 14 1595-1509 11 1899-1900 . 67,2\*\*\* ... \*\*

Notwithstanding that, you hope if it an increased area will be meintained ?- Yes.

- 223. Q. Also in Sholaper and Nasik !- Yes
- 231. Q. The increwe in Poent is elight?-Many of the is canal mater the people do not nea them.
  - 235. Q. Take the canal in Poena. Yen had-

Je 1905-96 . . 31,071 Actes infinated . Brillett . 25,664 . .. ., 18,7568 . . 34)60 a legion . . 31 10 1

How do you second for that?—It is very difficult to answer that question without folly straights it. J. Mollie -

230. Q. Would you prefer small tanks to large for 10 Dec 0; rada sull, or do you refer to tlack soil only !- West soil 10 Dec 0; chiculy.

- 237. Q. Would the present he a very good time for pushing the extension of well's!—Not the people are hard up; they have not yet recovered from the ewests of the famble, and I do not think that they have the means to do much thereafter. They have no cattle and no money.
- 238. Q. Do you think that the a luministration should not be discounged if their efforts are not such that one of an one f-Gradual efforts for well extension should be trule.
- 232. Q. Do yen think people would be built to be encouraged. If Government alcance i money to dig wells and charged a larger if an enumer i instead of taking lack the alvance?—When call rather apply for tall will they are not certain that they will got all the money and for.

  240. Q. What do con mean?—They are not some that it endeance will reach them. They are red suce that if Government advances them has been their will get the whole a mount. Then they are not some eyen time.

- 211. Q. They might apply quiekly f-There are objections to thing father; the people has prefer to per heaver interest elsewhere if they do not actually get the whole sum from Government. The current belief is that a good deal "sticks" in the kands of the subordinate service.
- 212. Q. I suggest language assessment of Rs. 6 or Rs. 10 per acre as extra assessment for the well, instead of repayment of principal and interest for laterif—I would prefer the payment of interest and refund of advance during a long term of years.
- 243. Q. Why?-Recurse in that eye the people know precisely where they are, and can calculate definitely whether it will pay them to take the money or not.
- 211. Q. If you take a single well it would pay so much for area irrigaled by one Jost There is speculation shout
  - 215. Q. Where P-I should prefer Interest.
- 216. Q Why ! I want your reasons, Trey might agree to any h-gayat mies calculated on actual advance of money Covernment if they were certain of getting the whole of the money.
  - 217. Q. They prefer talmif -Yes.
  - 215. Q. Do you think they prefer long in talments :-
  - 219. Q. More than twenty years?-No.
- 250. Q. (Mr. Hibrison).—One core question Woold you tell us whether in the tracts of Gujarst, where there are neither tanks nor wells, the average sice crup is a peop one's—Yes, in the poorer parts, i.e., in the Mehmadab id taluka of Kaira district and in the western villages of Ahmadabad is inducible new. It is decidedly poor.
- 231. Q. Even in those parts where rainfull is mere reliable the existence of small tanks would largely increase the average yield?—Unquestionably, if the tanks can give two or three waterings in the second.
- 252. Q. Could you give us any very rough estimate of the average value of the yield without tanks as a galact the average with tanks. By what proportion would tanks increase the average yield i-Double, at any rate, in the case of a liberally cultivated crop.
- 253. Q. It has been reggested to us that it does not increase it by more than 11 to 10. Do you think it at estimate is inserrect?—Certainly, manure and two or three waterings at the coll of the acasen would double the enturn in ray opinien.

Witness No : : - Mr. J. A. G. Warrs, Arting Collector, Surat,

Acres to Proved Qualities.

Geren uren . . 3,058 \$21 Collorably asia. 715.453 lit out on we be them the arrest 12.473 rightly providing. 2.1.25 There are no private imposition works, other than wells, Mr. J. d. 42 and no villege mores. The sell is block, part for rel. Water is at face it postaling of the qualities of black and private compact first colorate mostly and graden and first. In 16 th cells, played erope one is from 1850, but in 470,000, and size (7.4% By of their rice alone dependent tank insight of our recope superiore is the most in potent inspared or given the dependent in particle wells. It is fall, as well appear from the are in particle wells. It is fall, as well appear from the are in properly from 78 index on the actif to 150 mer en into rest.

Mr. J. A. G.
Wales.

10 Dec. 01.

	Averagitwenty 1891 – 1	ears Ma	ximqm.	Minimum.		
	Ins.	cts.	Ing. ots.		Ins. cts	
Chorási Táluks Olpád du	. 35 8	86 In 1894 10 1894	. 65 08 . 52 90	In 1800 In 1600	· 18 40	
Bárdoli do.		16 In 1891 10 In 1883	. 73 e3 . 80 35	ln 1890	· 17 03	
Chlabit do. Jalálpar do.	. 07 %	9 in 1883 19 in 1884	. 109 82 . 82 61	In 1890 In 1899	· 24 40	
Bulsár do. Párdi do.	. 65 6	10 1893 1 10 1892	90 59	In 1899 In 1899	. 30 07 . 31 10	

There is a demand for tank water, during the southwest monsoon particularly, when the min ceases too cerly or there is a very long break. Rice is practically the only crop dependent on tank irrigation; it requires two to three waterings between June and October. The last flooding is must important, because it ensures a good harvost of rice and a second crop of val (large-fruited dolichos). Sugarcane has to be watered three times a menth during the hot weather; it takes about eleven months to come to maturity and has to be watered at intervals during all that time (the raius excepted). There is no official control over the distribution of water from irrigation tanks, each man taking the water when he wants it. Irrigation revenue is realised in the form of onhanced assessment.

- 3. Small tanks in black soil hold water well enough us a rule; masonry core walls are not used in this district, so far as I am aware. Even in case of good and seasonable rainfall there would be a demand for water for ruce. The irrigation revenue from tanks is a fixed item, being paid whether water is taken or not. Rice is very commonly grown in black soil and it is for ruce oultwation that tank irrigation is resorted to in this district.
- 4. The existing Government Irrigation Works consist of 702 tanks, of which 287 irrigate each 20 neres and more and 70 Government wells. The normal area nuder irrigation from the tanks is 12,362 neres and from the wells 1,475 acres. There are no statistics available to determine the range of variation. Neither tanks nor wells are to be depended on in a acasen of drought, the tanks even in a good year seldom contain water much beyond December and wells run low in a season of drought. The Tapti Canal Scheme and the proposed Utova and Amba Párdi Tanks bave been munuted on by Mr. Beale. I may note that the Ulpád branch would traverse part of a waterlogged aree. Semothing on a smell scale might be done in the way of bunding up the rivers and etreams of the district, but the repair of the existing tanks is the most pressing reatter.
  - 5. There are no Provincial Irrigation Works.
- 6. The present irrrigation works are all of old standing, duting back probably to the ante-British period; us now works are constructed now-a-days. The old works are repaired as necessity arises and funds permit, by the Publio Works Department, who are kept informed of the state of the tanks by the Revenue Department. The number of these works, etc., has been given in paragraph 2. During the last six years less than Rs. 10,000 a year has been spent on the up-keep of irrigation tanks, and of this Rs. 10,000 the rayats contributed nearly Rs. 1,500. Government is supposed to maintain the tanks in officient order; the himayat (water-rate) would only be remitted when a tank is absolutely useless and there is no intention of repairing it. I may quote the following from the despatch of the Secretary of State on the report of the original settlement of Jalaipur (paragraph 4):—"There can be no doubt, as Mr. Hope remarks, of the obligation incurred by Government to maintain the supply of water for lands on which, in consideration of that emply being exceptional, they have imposed an exceptionally high rate of assessment, and it is of the first importance that the Government should not be justly liable to the imputation of a breach of faith with respect to this obligation." I am not in favour of district funds, as a rule (certainly, it is so in this district), are all required for roads, schools and other legitimate objects of Local Fund expenditures. I nm not exaggorating when I say thut, so far as my experience goes, not one tank in two is in good condition; I am strongly in favour of devoting more money und greater attention to the np-keep of the existing tanks; the construction of new tanks is desirable, but this can etand over till the old ones ere in repair. This district is pretty well off for tanks and the provision of new ones is not an

urgent matter. The villagers often depend on the irrigation tank to supply water for mon and cattle, and even if there are tanks and wells for donestic purposes, the irrigation tanks are a nesculstand by. Ordinarily the village water-supply is ansilicient.

- 7. The number of pakka wells is estimated at 5,726; there are also between 500 and 600 kachcha wells. Each well irrigates about 3 neres; the area under irrigation in an ordinary year does not differ appreciably from the area in a year of drought. About 35 new wells have been constructed annually during the last ten years, half by the aid of takavi grants. A reduction in the rate of interest, and an extension of the period of recovery would possibly atimulate the construction of new wells; the present period (20 years) seems to me long caough, but the interest (5 per cent.) might be reduced. The water level of the wells has sunk owing to the droughts of 1800—1901, but there has been no wide-spread failure of the water-supply. Some ran dry and were deepened with more or less farourable results. The depth of water below the surface varies from 25 feet in the cast villages of Olpád táluka to 80 feet in some parts of the Bulsár tuluka: 35 would probably be the average depth for the district. An irrigation well costs from Rs. 300—500 and protects three acros.
- 8. Part of the cast of Olpád táluka, some 20,000 acres is affected by water-logging and some drainage cheunela have been ent; others are proposed, but the report on those already mede is not favourable. At present remissions are being granted to the extent of Rs. 8,700, and proposals lavolving remission of Rs. 22,000 are before Government. It would, therefore, pay Government to earry out any works which would reduce the extent of the ovil at a reasonable cost.

## II.

## A .- General.

- 1. I have served in the Snrat District for four years. My personal experience is confined, however, to the talukus of Chorasi and Julalpur.
  - 2. Table \* attached.
- 3. There is no obslacle to the extension of irrigation from any of the causes mentioned.
- 4. Under the Bembay Land Revenue Code increese in the value of the Lind due to private improvements is not taken into account in revising the assessment.
- 5. Leans under the Land Improvement Act have only recently become popular owing to the bad years; the tightness of money during recent years has driven the rayat from the savkar to Government. I am in favour of a reduction of the rate of interest.
- 6. The state of things contemplated in this question is impossible in this district.

## D.-Tanks.

- 23. The tanks are supplied from the catchment area by naturel drainage; the water is distributed by means of earthenware pipes let into the bank, but occasionally the embankment is ent. The supply is maintained till March in a year of ample rainfall; till the beginning of October in a year of scanty rainfall. It a year of drought the tank would never fill. Statistics are being collected to ascertain the mea ordinarily irrigated.
- 24. In this district it is usual to grow rice followed by val (deliches lablab) and divel (caster-oil): these are the only crops grown by tank irrigation. In a year of ample rainfall rice requires irrigation to yield a full crop; in a year of scauty rainfall there would be no crop at all without irrigation; in a year of drought there would be no irrigation.
- 25. If the supply commences too late there will be difficulty in transplanting the seedlings, as they will be on mature to be transplanted; if the supply ceases too early, then the crop will fail, as rice requires its last watering in October, and there will be no chance of a second crop of val-divel.
- 26. Lands irrigated from tanks are not irrigated also from wells.
- 28. The irrigation rate is peid in the form of onhancement of land revenue; on an average it is Rs. 4 per acre. It is paid on the whole irrigable area.
- 29. Little private expenditure is necessary, the cultivator does porsonelly all that is required. In a few cases one or two men are kept through the monsoon to see to the distribution of the water in the rice fields and ere paid in

kind fere candoad of rise by the people who use the

- 83. There are no mointenance charges; periodical repoles are executed as required and as londs permit. The average amount spent in repairs per acre irrigated is anno 13 pies & during the last six years.
  - 31. There are no private tanks in this district.
  - 32. There is no scope for this.
- 33. The tanks of the district silt up slowly; no statis-tics of silt appropriation are available. The silt is removed by expansion uten preventy.

## E - Wells.

F.—Welle.

\$4. Throughest the district, except in parts of Parli and Meddin, the average water-level is 35 in 40 feet below the surface of the germod, the water itself being six to ten feet deep. The supply Is chiefly from springs: in an ordinary year the wills last out easily and do not run dry in a year of decught. In the part of the district where irrigation wells are need, the mater does not ordinarily become salide. A well costs about Rs. 5(0), and with due attention will last 100 years and more. The water is raised by Lex (leather lag); the area commanded by a well is the land

- mithin 100 and 200 parts of it; the accracy area into Mr. J. J. C. ented to 3 acres gated in 3 some
- 75. As a role only one only is taken off land irrigated on welled in this district it is largely angainst or registered. The energy under wells are irrigated whatever the rainfall may be.
- 37. The owner of a well juys authors to Guteroment; a cultivator pays substill water assessment if his land has facilities for water whether he have well or not.
- SS. Serious difficulties are not exemptered in the selec-tion of a spot for a well, nor in the actual construction. No axistance is given by Government or local ledge.
- 39. I am not in farour of the coestruction by Government of wells in land savour of the construction by Govern-ment of wells in land which is private property, at least in this district. The cultivater can built a well considerable cheaper than the Public Works Department, and the takari system is the only form of Government I elp rejuited. If the well belonged to Government and the land were thrown up, there would be a dead less to Government.
- 40 Temporary wells are not commonly used in this district; a few were made in the famine sear, but in black soil they are not feasible, and this district consists principally of black soil.
- 1. Q. (The President)-You are Acting Collector of Surat !- Yes.
- 2. Q. Haw long have you held that office !- I have been Acting Collector for the last even months.
- 3. Q. You were here throughout the famine !- I was nel in a famine charge.
- 4. Q. You talk about irrigation by Government wells; what are they ?—They were caust veted many years and; I don't think any of them were built in our time.
- 5 Q. How are they managed now f-They are not managed at all 1 they are there, and if water is taken from them, we charge for that.
  - 6. Q. They are all Government wells f-Yes.
- 7. Q. Is there any demand for it; is there any enthusiasm about it among the people?—I den't think the people have alout it; I don't think there will be a beary demand.
- S. Q. Could you tell vs about the Amba Pardi tank? What is the history of the project?—It is a scheme that Geremment has only just northed out; it is entirely for famine labour. When Government were rather hand proceed, they found that this part of the taluka was the most in want of some relief works, and as the soil is suitable. for irrigation, they considered this project favourably.
- 9. Q. Is it suitable for rice irrigation F-I fancy so, it ere is also some black soil there.
- 10. Q. Has an impotes been given to well construc-tion during the famine i-A root marked imposes.
- 11. Q. You have many applications for taken advances row f.—There is not a great demand; there was a demand in the famine year. I think the demand now is better than it was before the famine.
- 12. Q. In the famine year the demand was largely for to-tria wilsi-To since extent.
- 13. Q. Do you attach much importance to the extension of well trigation !- Not as much as to the extension of tral, intigation.
- 11. Q. De you think there would be much stimulus if thisti advances were given in a clinterest before a far for farming would be considerable risk.
- 15. Q. (Mr. II eterni-Himf-l'ople monid apple win did not polly nagt it; there noull be a considerable rol of miss plients n of wedge.
- 10. Q. Y. n High the poly encell apply who did not not the many i-There were also a strong temperature for people to sok for more than they notice wated; there we did not property erest all outside in failing outsided or a man at that put the 200 today at the 500 to fix 400.
- 17. Q : The Provident)—In the interests of famire protected it is important to increase the another of medianne little with first or only will on foregoith-inversel. Wouldn't have some effect f-I think was

- 18. Q. Suppose we made another proposal, i.e. give taken to and have it regard by increased assessment on the land?—That is in one respect going lack to the old system of Government wells which has been alandened; I think the present system is the best.
- 19. Q. (The President)—Would you allow him to repay money by yearly payments of enhanced assessment?—That would be a permanent assessment on a private well; I think there would be tendency to fight thy of totavi under those conditions.
- 20. Q. (Mr. Muir-Mackenzie) Do you see any objection to the experiment being tried! No.
- 21. Q. What number of years do you generally allow for the recovery of takavi f-If it is Re 500, I take it in ten rests; not more than ien generally
  - 22 Q. The law allows 20 years !- Yes.
- 23. Q. Would it not be a popular measure to allow 20 years.—The meat would naturally prefer to extend the period of instalments.
- 24 Q. (Mr. Rhelson)—Would be not have to pay more interest?—There is a tendency to ask for as long a period of instalments as they can get-
- 25. Q. (The President)-You attach more importance to tanks than to wells ?- Certainly.
- 26. Q. (Mr. Mbetsan)—Why?—Recause one of the principal crops is rice, and they rever cultivate rice under
- 27. Q (The President)—linve you recent to believe that there is from for a large extension of tanks in your district?—In the Jalalpur Talaka, with which I am best acquainted, I do not think there is. There are quive as many traks as are required.
- 28. Q Do you consider that not one tank is in post condition f-Nearly so.
- 23 Q. I would gather from the tenor of your note that you consider that the first step to be taken to prepare the district against famire is to put the tanks in order r-Yer; and then make new tanks if you like.
- 80 Q. What is the extent of irrigation from tanks? Tanks of less than 20 acres irrigate 8,000 acres, of more than 20 acres, 10,000 series or 21,000 neres in all.
- 3t. Q. If the tanks are put into preper order, you would probably licence this are if—Yes, considerably a but it would still be small be proportion to the cultivable area.
- 52. Q. What measures would you adopt for the pro-vision of folder at the time of famines—from my experience of the last famine. I think, there would be little demonstry in this district, as the amount of land to der press is considerable, and there are forests closely.
- 23. Q. You think that familie labour could be better refered in eleving tanks than read-anthlops—Yes, there all he a large return to Government.
- 31. Q. (Mr. IPer, n)—We all there he a return to G reported of the tools we excluded—Yes, there will be an increase I mount of acceptant.

10 11/2 01.

Mr. J. A. G. 35. Q. Would there not be an increased assessment on the additional erea cultivated after clearing out the tanks?

— Yes.

10 Dsc. 01.

- 36. Q. Where wet assessment was paid where there was no water it has now been taken off?—I do not know.
- 27. Q. Are you of opinion that land which was assessed wet and does not how get water should cease to pay the assessment?—Yss.
- 33. Q. If you improve the water-supply, is Government ontitled to impose more assessment?—Yes.
- 39. Q. You say you are not in favour of District Funds heing expended on irrigation works?—Yes.
- 40. Q. There are a number of small traks; suppose Government were to assign the revenue to the District Beards, do you think they would manage these small tanks and keep them in repair?—No, the District Beard would not be a good agency; besides the revenue derived from these tanks goes to the expenses of the additional establishment required to maintain them.
- 41. Q. Do you think the people could maintain the tanks?—Yes, they could do it in some villages.
- 42. Q. You connot work through Patels !- No, excepting some very good Patels.
- 43. Q. Why ?-In some villages there are rival parties, and they would never work hermonicasly.
- 44. Q. You say a report was made against the dminage channel in the Olpad Taluka; what was the complaint?—The people complained about the scouring of the surface of the soil, and an officer was deputed to make inquiries.
- 45. Q. He came to the conclusion that the complaint of the people was justified?—Yes, it was well founded.
- 46. Q. I understand there has been no famine in your district for 63 years ?—That is not quite correct; there was famine to a considerable extent in the Maudri Taluka; there was famine also in Olpad and in the south of the district.
  - 47. Q. Was it sovers ?- Very severe in Mandyi.
- 48. Q. Not elsewhere ?—I do not know, I am speaking from what I have read.
- 49. Q. Have you got records of previous faminee in this district P—Not for the last 60 or 70 years, doring which there was no famine; there was only scarcity. Surat has always been free from famine till the last three years.
- 50. Q. Under these circumstances, would you spend money on protecting Surat P-No.
- 51. Q. You could not tell how many walls were dug in that part of Surat where there was famine f—I could not.
- 52. Q. (Mr. Rajaratna Mdlr.)—You say the District Boards will not be able to manage the tanks, and that the people would not he willing to help them. Would you like to transfer the management to the Revenue Department? Do you know whether the Revenus Department would be able to undertake the repairs, if funds were forthceming—some hody must repair them?—I do not see what agency could be employed.
- 53. Q. Iu the Madras Presidency, tank irrigation is under the management of the Revenue Officers?—We too should have a special establishment for that purpose.
- 54. Q. In that case the Revenus Department would be able to undertake the management of this work?—Osrtpialy,

- 55. Q. You ebject to the Public Works Department cerrying out this work ?—Yes, because it is not worth the cost.
- 56. Q. In paragraph 4 you say "the normal area under irrigation from tanks is 12,362 acres and from wells 1,475 acres."—These are old figures; they are not to be absolutely depended upon.
- 57. Q. Do you not measure the area svery year ?-Not actually.
- 58. Q. Was any remission granted on wet lands during the lest famine, under tanks which ran dry ?—Not specially on wet lauds; if a man had not the meens to pay the assessment he received remission whether his lands were wet or dry.
- 59. Q. Is there any reason to believe that the probability of the had assessment being liable to be enhanced at the next revision of settlement, prevents the people from digging wells?—I doubt it; I have never heard of it until I heard it in evidence here.
- 60. Q. In paragraph 37 you say "the owner of a well pays nothing to Government; a cultivator pays sub-soil water essessment, if his land has facilities for water, whether he has a well or not." Does the sub-soil rate vary in different localities?—I do not know what the sub-soil rates are. They vary with the character of the suh-seil
- 61. Q. (Mr. Muir-Mackenzie)—I understand you to say that the area under rice which receives assistance from tanks is probably about 23,600 acres?—Yes.
- 62. Q. The total area of rice in normal years is 106,000 acres?—I make it 80,000; it fluctuetes.
- 63. Q. I have get 106,100, from the agricultural statistics of the Government of Indis. Supposing it to be 80,000, do you think it would be advisable to have tanks constructed in order to possibly improve, or at my rate gnard, ngainst a fluctuation of the water-supply of the remaining 60,000 acres ?—Yes.
- 64. Q. Do you think there are many sites for these tauks ?—I do not think there are many sites.
- 65. Q. Would tauks be no good along the sea coast ?—I do not think so, I doubt it.
- 66. Q. Suppose, for the sake of argument, that the excess of what is called untanked rice over tanked rice is very considerable in the Chikbli Taluka, don't you think it might be likely to find sites in that taluka?—I know very little of Chikhli Taluka, but you might make tanks there as it is a billy country.
- 67. Q. In paragraph 8 of your memorandum you say "at present remissions are heing granted to the extent of Rs. 81,7C0, and proposals involving remission of Rs. 22,000 are before Gevernment." That means that, if we could remedy this water-logged condition, we might possibly get back that amount of revenue; it would be worth while to spend a good deal for that P—Yes.
  - 68. Q. Have you seen any of the drains?-Yes.
- 69. Q. Havs you noticed any sign of their had effects?
- 70. Q. Do you know anything of the proposed reclamation schemes?—Yes; I have seen one.
  - 71. Q. Is that the reclamation of the tidal area?-Yes,
- 72. Q. You don't know of any reclamation to onre salt apart from shutting out tide?—No.

# WITNESS No. 94.—BRIKHUBHAI AKHUBHAI, Bulsar Teluka.

Answers to printed questions.

Mr. I am now 55 years of age, and I am engaged in agri-Bhikhubhai culture for ell my life.

Baikhubhai.

10 Dec. 01

3. (1) No.

(2) Cattle not eufficient; mors required.

- (3) Manure, as at present obtained, will be insufficient.
  (4) The laud consists of black, gorat, dadri (stony).
- Black soil is not much suited to irrigation.

  (5) Yes. It will be a bar if the supply is uncertain, sto.
- (6) Yes. Lack of capital; there can be found one or more cultivators in each village to undertake cultivation by irrigation.
- (7) No.
- (8) None.
- (9) Nene.
- 4. I constructed a new tank, area one acrs, last year, which irrigotes merely four acres, but at the revision survey my jarayat land has been assessed to kiari land.

It was thus not exempted from enhancement.

The assessment of my jarayat lend, which was Rs. 1-8-0 per acre, bas been raised to Rs. 4-0-0.

No,

Mr. Britactra

If Greenment agree not to enhance assessment, say, for a period of 100 years, people will be induced to use private engila.

5. No con takes takevi for anch purpues, as irrigation on an extensive scale is not in existence in this district.

It should be publicly annuanced to the villagers that takari can te go: for irrigation.

- (1) 500,
- (2) Yes.
- (3) Yes.
- (1) Yes. (5) Yes.
- (6) Yes.
- G. No. A few persons may be induced to seek the indicated areas.

Yes. People have strong desire to extend irrigation.

- 23. (1) Natural, by rain water from adjacent lands.
- (2) In low-lying lands by word suplas or by loss.
- (3) (a) April to May.
- (5) November.
- (a) July or America.
- (1) It depends on the nature of the sail. To irrigate one note of tand from June to November the area of the tank should be three seres.
- 24. (2) It depends upon the value of the crop. Say, if sugarcane is grown the value of the produce will increase by Rs. 50 per acre.
  - (3) (a) One acre will produce 200 manuals of molarses.
  - (b) Fifty mounds prace.
  - (c) A77.
- When the tank water fails, as the crop will 25. Yes. fail but for the well water.
- 27. Cannot say, as there is no proper irrigation.
- 28. None exists.
- 29. It depends upon the distance that water is situated.
- It will be from Rs. 25 to its. 30 for the reason.
- 50. A few tanke which irrigate more than 20 acres are repaired at the expense of the State, the villagers contri-bute 10 per cent. of the expenses. No arrangement is made to clear six nor any watch kept.
  - 31. None exist.

- 32. Yes. Government should give land free and advance money as taland without interest.
- 23. Tes. Cappel say, but it may be about five feet although as within the years. It depends on the nature of the sill No deed fing or other continuous is and yield. I would 10 Dec. Ct. propose that same arrangement should be under to fill up table. I tellers there are rules in the Public Works Defaurment to provide water to table. Some arrangement should be made by which more water can be carried to the table.
  - 34. (1) From 45 to 60 feet.
  - (2) By springs and by percolations
  - (a) Yes.
  - W Yes
  - (3) Ila. 5"0 to Re. 600.
- (1) Up to 100 years if sweet, or else 25 years.
- (3) By Los.
- (7) From three to four serve, and much depends upon the depth of the water.
  - 35. (1) 13.
  - (2) None.
  - (3) (a) One hundred per cent.
  - (b) Fifty do.
  - (c) A71.
- 37. (1) For bagayet double.
- (2) Less than double on the area of land netually bris galed.
  - 39. (I) No.
  - (2) Yes, n little,

None.

Yes.

- 39. No. If Government can give a well free of cost, Government will like to give water to others as the well would belong to them, and this is objectionable.
- 40. Very soldom. To a great extent. If Government can give money. Also at the revision the arresement was not raised on account of kartela wells?

The talaxi should be given at once. There is a great delay which endes out much of the advantages.

There are small rivers in the talula lwhich, if bunded, will benefit the cultivators greatly. There is a spring near the Parners which, if bunded, will benefit many villages.

Artesian wells should be enenuraged.

- 1. Q. (The Precident through an Interpreter)-What land do you pre-cee?-Eighty nores.
- 2. Q. What is the land used for ?- For cultivation of regelables and chilles.
- 8. Q From we h?-From wells and tanks.
- 4. Q. Have you got sice also?-Yes, 2) arres.
- 6. Q. Is all that O'nerror nee? Yes; of the rest same is me calcivated and some calcivated; a portion is reserved for grave.
- 6. Q. Dil you find the grave modul for the cattle during the last year of de nglith-Yes, I was a ble to keep my cattle alire.
- 7. Q. Dil the cattle die much in your taluka?-Yes, in later nur.bers.
- 8. Q. Il warang mel'elave you got!-Two.
- 9. Q. In every village elete is an increase in well irri-
- 10. Q. They build we'll from talker advances for Yes. from taker preads and also from their new recourses
- D. Q. The manner at present obtainable is brand'elent for a languagese in the uses orbiteated for Tex.
- 12 Q Where do you get your memor from ; from earth-f-You; I have get not open carelo. 17 Q. De you know southing about manner as all cased -We want to very plants a to the want of tomory we count there are expenses and each manner.
- IL Q In appeter in the even Growing Thomas I face a atomic desirate extenders put of familiating families put to be a no water and they now really that impation would be a krest been

- 15. Q. How do they show their "strong desire;" by taking takavi advances?-Yes.
- 16. Q. But you say only few takars a lyances are taken where there is the strong desire f-l'cople are afraid of taking talari.
- 17. Q. Why F-If a man is not able to repay the Gar-ernment instalments when they fall due, the whole debt is collected from him at once.
- 18. Q. Has that ever happened full as said that measures will be taken to recover the amount at orce. know of no specific instances.
- 19. Q. You say" the talast should be given at once Turne is great delay which tales out much of the advantages" What are these delays?—Hour applications for taken are granted we get the mency after six months.
- 23. Q. Why so long as that?—Inquiries are made through talules and villages by the Mambalar ple relimite life separt to the telah a theory who refers the matter to the Celletter; and so the cultivator who applies for taken does not get it in time.
- 21. Q. (Mr. Histor)—You say that your hand assessment use raised from Ba 1-5 to Ra. 4 in the revision of estilement; have you improved your help thy was it mainth—license I madence Alari land. I converted depote plants into similards. If I make a tool at the next remains of a thomas that tank will be changed for.
- 22 Q. Do you knew that amording to law you con-not be clarged on the fact it—Trace is a sillore near Lab-jorn in the Polish Taloia where on lat has been a tack Gra-cumment have bried water government to asset the land also i.kirria

Mr

- 23. Q. You say at the original settlement the assess-Bhikhubhai mont was not raised on kachcha wells; was it raised on Akhubhai. pakka wells?—A sub-soil rote was charged.
- 10 Dec. 01. 24. Q. It is charged on kachcha walls clso?—Yes; the well as on other louds which adjoined to it owing to the sabsoil water.
  - 25. Q. Do you mean to say that if a man makes o well he gots his own assessment raised and also that of his neighbours?—Yes, if he has a well in his lond, on the land adjoining to his land, within 80 chains of his well, the water rate is levied.
  - 26. Q. Suppose there had been no well, would the subsoil rate have been charged?—Yes.
  - 27. Q. You say you would like Government to moke n well in your land free of cost headese the well would belong to you. Snppose Government gave the well to you ond then levied a wet ossessment, whot would you say to that !—I would not like that.
  - 28. Q. Why?-Beeanse the assessment would be reised permanently.
  - 20. Q. (Mr. Rajaraina Mdlr.)-You referred to a tank; was it constructed in your own land or in Goveroment land ?-In my own private land.
  - 30. Q. Did you opply for permission to construct the tonk !-- No.
  - 31. Q. What crops do you grow on the land irrigated by the tank?—First I sow rice; afterwards either sugarcane or chillies or brinjals if there is sufficient water.
  - 32. Q. Do you irrigate the rice crop also?—Yes; when there is no min I utilize water from that tank to irrigate riee.
  - 33. Q. Havo you an ombankment along the rice lands? -Yos.
    - 34. Q. When were your wells dug?-In 1671.
    - 35. Q. After the original settlement?-Yes.
  - 36. Q. How many acres can you irrigate from your two wells?—One or two nores.
  - 37. Q. What assessment did you pay on these lands before the Revision of Settlement?—Ro. 1 per acro.
  - 38. Q. What was the obsessment at the Revision?-Rs. 4 per ocre.
    - 39. Q. It was roised from Ro 1 to Rs. 4?—Yes.

- 40. Q. You hove got a tonk os well as wells situated in the same field P-Yes.
- 41. Q. The land irrigated by wells can also be irrigated by the tank f-Yes; water in the wells was not sufficient this year so I irrigated from the tonk.
- 42. Q. Under the Rovision of Settlement the ossessment was raised from Ro. 1-8 to Rs. 4?—Yes.
- 48. Q. (Mr. Muir-Mackenzie)—Do you know anything about selling grass in Bembay !- I do not sell gross; whot I have I reserve for my cattle.
- 44. Q. Did you grow any crops from your wells in the femine year of 1899?—No.
- 45. Q. You did not use your well at all?—No, because there was very little fodder and if I had used my cattle they would have died.
- 46. Q. These two wells were dug out of your own money?—One was dug out of my own money, and I got the other well with the field which I purchased.
- 47. Q. Purchased out of your own meney, or did you borrow the money?—My own money.
- 48. Q. If you want to borrow mency to make a woll what rote of interest have you to pay to the bania?—Six per cent.
- 49. Q. Would you like to see more tanks made in your taluka by Government for rice?—It would be very beneficial; there is special necessity for more tanks.
- 50. Q. There are many places in which tanks could be made?—All the land belongs to Government; if Government wish to dig a tank they can acquire the land. There are plenty of sites.
- 51. Q. Do you know many other people besides yourself who have dag tanks of their own ?—If people were not afraid of Government raising the assessment they would build many more tanks.
- 52. Q. You say you pay Rs. 4 on these new kiari lands; what was the rate ou the old rice lands?—Rs. 12 or 13 per acro.
  - 53. Q. On old kiari londs !- Yes.
- 54. Q. You now pay Rs. 4?-Yes; my lond was jarayat.
- 55. Q. On new kiari land you pay very much less than on the old kiari?—It is less than the old kiari rate but the land is poor.

Witkess No. 35.—Kuan Samed D. Dudnithmor Bilimonia, Mambidar, Ankleshwar. Answers to printed questions.

D. Dhunjibhoy.

1. The subjoined statement gives information about culturable and irrigable oreo, etc., in 1900-1901.

10 Dec. 01.

		ÅRZA	PROTECTED BY			
Gross nren.	Culturable area.	Government irrigation works.	Tanks.	Wells.		
85,747—32	76,052—8		1898-	-1809. 302—54		
		•••	1899-	-1900 698-32		
		100	1 900- 1—11	1901  154—20		

Character of the soil.

- Panod.
  2. Chorasi.
  5. Divi.
  4. Diva Rojput Party.
  5. Diva Bohrá Party.
  6. Survadi.
  7. Samore.
  9. Chbapra.
  9. Sajod.
  10. Pumgám.
  11. Haripum.
  12. Ankleehvar.
  15. Maudwa Buzran.
  14. Sarangpar.
  15 Andádá.

- The bulk of the land consists of black soil, but in the morginollyneted villages, there is o very large area of Gorndu land which is suitable for producing irrigated crops.
  In the black soil cotton, juor

and til are largely grown.

The principal crops grown are juor, cotton and til. They do not require irrigation except in years of drought or scanty reinfall. Rice is elso grown in this toluké which require to be irrigated, but the Kiari land is dependent on tanks, the water of which is sufficient in years of ordinary rainfall.

In some places wheat ond gram are grown when there is sufficient moisture in the land ond so the crops do not require to be irrigated in ordinary years.

The minfall during the last 11 years in the taluka is given in the accompanying statement. It seems that in this taluka there is in some years domand for water during sonth-west monsoon.

The crops in this talnka are irrigated from tanks and wells. The crops irrigated from tanks is chiolly rice.

The crops irrigated from wells are sugorcano, ginger, onion, wheat, and other vegetables. Irrigated crops from wells are raised in the 16 villages mentioned above. In the other villoges there is hardly ony well used for irrigntion purposes.

Only those fields which are assessed to tank water assessment ore privileged to toke water from the tonk and the tonk water ossessment is consolidated with the assessment of the soil.

At the time of the introduction of the present survey a special water-rate was assessed on lond liable to be irrigated from wells, and all land so assessed can toke water from the well. This well woter assessment is else censelidated with the assessment of the soil. In the revision survey

this woll woter assessment will be obolished and oll land, whether heeded by wells or not, is to be assessed with sub-soil water essessment.

3. If in block cotton soil tanks be excavated, till yellow earth is reached, they can hold water. If such tanks be engelmend they can be of no need unless the Jardynt land surroundling it be converted into Misti land.

Klari land sum in ling tanks is the only land irrigated in all land swing that rell and in years of fair or good rainfall, there is no falling off in the arm irrigated and the revenue is not proceeding because people have to pay the mater assessment whether they take water or not.

Owners of Unik call desire to have more tanks, he they can convert durant land surrounling new tanks into Kinries, and such tanks if constructed are expected to be as monumentary and as important as the tanks now in

		•			
5.	•		•	•	6

6. All tanks are in existence from time immemental. They are control'd by Government. In this talaki there are in all 11st tanks which pay bringstien revenue, the area spread being \$10 area and 26 guntles.

As Generation have record a material on a certain number of fields, it is their duty to ese that the tanks are maintained and repaired to such an extent that all fields aures il nu ler ti em cen obtain unter.

Ercluding expenditure on rebel norks during late famines it is east that Government hardly incur any annual expenditure on such tanks.

Except during the last two years hardly any remission of the last base been given in other years of scanty rainfull. No new works of this class have been constructed of late years. District Local Boards or private owners have not undertaken such works. It is not desirable that District funds should be expended on such works. It has not been the practice for Government to encourage the construction of such works by leaves to District Boards or to land-owners. They receive value of these works can be increased by dividing to be money and greater attention to their up-keep. These works are also very useful as they supply water for money and cytile.

7. In pursyaph 2 has been given the total area irrigated by welle in ordinary years (1895-99 and 1895-1891) and in the year of drought (1895-1800). The number of new wells constructed annually during the last 10 years is as

Text.			Ne	er ber Chrem wells censtracted,
1521-92	•	•	٠	3
1602-00		•	•	5
1593-91 7				
1894-85	•	•	•	3
1575-96	•	•	•	3
1600-61 )				
15,77-93		•	•	11
1535-93				
1892100	•			15 '
1900-1901				•••

The following table gives information about advances made by Gorennard for the construction of wells during the last 10 years :

						, , ,	•
Yest					Na of present to who made and economic made.	Total an root advanced	D. Din
						1:4,	\$1) ] %~. t/\$.
1501-02		•			1	220	-
15:2:43					***	***	
141201					***	***	
3 64 1 45							
1593-98			:	-		1,675	
1526-97	-	-	-	•	•	1,010	
	٠	1	•	•	***	***	
1527-83	•		•		***	***	
1525-23						444	
15142-11473			•		'n	(6)	
1600-1101	•	•	•	•	•	101	
7 5.7.1.7.7	•	•	•	•	***	***	

Except in the 15 rillages mentioned above, it is not pos-sible or desirable to reimplate the construction of rew nells by more liberal alrances or inducements for the following reacons-

- (1) Wells are required to be due very deep.
- (2) The mater obtained is often salt or turns out salt after some years.
- (3) Prequestly a stratum of partly called Kohada interrenes which it is very difficult to dig out.
- (1) The wells do not last for a long time.
- (6) The water-enpply is not sufficient.
- (6) Much of the water is wasted as the land Irrigated
- (7) Anyhow the people do not desire to construct wells in the villages of black soil as the product of the irrigated crop is madequate to the cost

Almost all the wells for irrigation purposes are situated in the 15 villages mentioned above, and although people have constructed new wells in these villages recently, they have not borrowed money from Government. Meet of the wells last to be deepened owing to the recent droughts, and as the rainful in 1900-1901 was scauty the supply of water in the wells is still deficient.

No well is said to have fallen into disuse owing to the droughts.

In the Geradu villages the total average depth of the wells is 25 to 40 feet and 50 to 55 feet in villages having black soil. The average rost of construction is Re, 600 in villages of Gonain land. In villages of black soil a very few wells were constructed but they fell into discovery every soon.

In this inluke almost oil wells have one kee and the average area at ached to and commanded by a nell is 7 ners, and the average area irrigated by a well in anyone year is 4 ners.

1. Panel. 2. Chapta. 3. Achieber. 4. Unarwick 5. Ale-j. 6. Fairur. 7. Karmill. 6. Revin. 10. Pardi Idrie. 11. Hardin. 12. Achieb. 13. Achieb. 13. Achieb. 14. Achieb. 15. Achieb. 15. Sarti 16. Sorti 17. Varia. 17. Varia. 17. Varia. 18. Dail.	8. In the villages noted in the margin lands are water-log-god, and therefore addition drinage works are required all Government cost. If suitable drainage works to provided and repared occasionally, waste land is likely to be taken up for entities for and the revenue of the water-logged occupied land mould be assured.
--	--

2. Relief labour was employed on the expansion of tanks and knobleds roads and collecting stone in the European Score of the knobleds made undertaken more left uncompleted. Village tanks excurated contain more water than usual and have thus proved beneficial to the people for matering cattle as well as for irrigating Risri lands.

## H .1 -General.

- 3. The answers below refer to Ankleshwar Salzaka of the Brooch Metrick. I have been serving as Mambadar of this teloka for the had \$1 moddle.
- 2 The arrespe mickel in each month of the year has been placed it read of the accompanying statement.
- 5 (1) and (2) for the resume given in paragraph & G. B. For 1216, I am and in favour elecustrating more wells in the Mach well utilizers. If water can be obtained by for

from tonks and canalass very large saws of land one to irregard with the present population and the present stock of bullecia.

of pairwise.

(b) In Israe towns, must of the non-aminutualite base exists for describing pages on and the people of neighboring without can these taken a supplie of majour from these what it shall not the roun. It is said that if from he shall the plants out down and wattered on the land after sime days, it would supply so folice transce. Apple, had soon with the does not implie to be majored sent

D. Dhunji: year. Again, people oan purchase castor-oil oakes which is bhoy.

- 10 Dec. 01.
- (4) The bulk of the land in this talnka is black cotton soil, and it is said that it is not unsuitable to irrigation, for, besides the crops of juar, ootton and til, other irrigated orops can be raised on such land.
  - (5) If canals of continuous flow be constructed (if feasible) leading from the rivers Nerbudda, Tapti and Kim, there will be no obstacle to the extension of irrigation by these means.
  - (6) Cultivation of irrigated crops is costly, but if advances be made for a few years, people will be able to continue such cultivation with their own means.
  - (7) Poople do not auticipate that there will be any perceptible increase in the assessment, or in reat by the extension of irrigation, beyond the water-rate they will have to rev.

(8) There is no uncertainty of tennre as regards Government land, end cultivators, though they mortgage their land to Sowkars, enlivate it themselves. Again, Sowkars are now parting with the land in their possession.

4. Land irrigated from works constructed by private capital are exempted from enhancement of assessment on account of the irrigation.

No tenant in this taluka has constructed any irrigation work in his holding.

- 5. Leans under the Land Improvement Leans Act are not freely taken by the people as will be seen from paragraph 7, G. R. No. 2275. For the reasons given in the same paragraph, I do not propose to give takavi for wells to the black soit villages. In the 15 villages mentioned in paragraph 2, G. R. No. 2275, all the wells are situated, and the people of these villages do not berrow money from Gevernment for that purpose.
- 6. Except tanks and wells in the 15 villages near the river Norbadda, there are no irrigation workslin this taluka, I therefore cannot say whether the extension of irrigation tends to injure the remaining cultivation by attracting its oultivators to the irrigated tracts.

People of this taluka have oviaced their desire to have firstly, canals, and secondly, tanks.

# D.-Tanks.

23.

- (1) The tanks in this taluka are supplied with rain water.
- (2) Only that land which is assessed to tank water assessment is privileged to take water from the tank. In big tanks pipes are laid for taking water, which can be obtained by flow, as long as the level of water is above the pipe. Again, water can be taken by removing earth from the banks and repairing the breakages at the expense of the person thus taking water. But if water be very low, as is the ease in years of scanty rainfall, it can only be obtained by lift, which process is both expensive and laborious.

(3)

- (a) In a year of ample rainfall water is sufficient for the monsoon crop, and another irrigated crop can also be raised in the same land even without water.
- (b) In a year of seanty rainfall the water hardly suffices for all the land assessed under the tank, and if there be no late rain, no irrigated crop can be raised.
- (c) In a year of drought, the water does not suffice for the ordinary monseon erop, viz., rice, but owners of some of the neighbouring fields can utilize the water available for growing crops of juar, bajri, etc., or fodder crops.
- (4) The area ordinarily irrigated from a tank depends upon the size of the tank, the quantity of water available and the degree of facility offered for taking water such as lift or flow.

26. In this talnka there is hardly any well in or near the land assessed under the tank.

(1) In this taluka, all tanks belong to Government, and the average water-rate levied by Government unnually is Rs. 4 per acre.

- (2) I do not think that the cultivator of land assessed with tank water assessment has to pay more rent.
- (3) No more, beyond the water-rate mentioned in paragraph (1) is to be paid to Government.

The rate is paid on the total area of land assessed to tank water assessment.

29. The expenditure for bringing water to the field varies with the distance of the field from the tank. It also depends on the way in which water is taken, that is, by lift or llow.

The expenditure is generally incurred by the person who cultivates the laud, and he is bound to pay rent to the owner of the land, whether he receives water from the tank or not.

30. As regards watching no ostablishment is required. Irrigation tanks have been occasionally repaired, and silt has been removed, from Local funds or Provincial revenue, but not completely and not to the satisfaction of the people.

The approximate annual cost per aero irrigated varies from Rs. 25 to Rs. 30 including the price of manure.

At present tanks are not repaired to the extent to which they may hold as much water as may be required for irrigating all the fields assessed under them, and so some arrangement should be made to repair them occasionally, in order that all fields assessed under them can obtain water.

- 31. In this taluka there is no tank constructed by a private person or persons.
- 32. I do not consider it advisable to encourage and assist the construction by private persons of further tanks.
- 33. Tanks are liable to silt up, and therefore do not contain the quantity of water required in all the fields assessed under it. Some tanks have silted up so mueb so that they retain hardly any water. The silt is removed by oxeavation. Hitherto proper care does not seem to have been taken to provent the silting up of tanks.

# E .- Wells.

34.

- (1) Vide paragraph 7, G. R. No. 2275.
- (2) Almost all wells in this taluka are in the 15 villages of Goradn land. They obtain water from springs, but water drags with it a large quantity of sand, and it is thorefore necessary to clean these wells very often. These wells are not liable to fail or to become too saline to use in ordinary years or in years of drought.
  - (3) Vide paragraph 7, G. R. No. 2275.
- (4) The average duration of a well depends upon the occasional repairs. If the wells be repaired frequently they may last for many years, at least up to 100 years.
  - (5) Water from wells in this talnka is usually raised by water lifts\* made of skin drawn by bullooks.
  - (6) and (7) Fide paragraph 7, G. R. No. 2275.

37. At the time of the old settlement, the irrigation capacity of each well was tested, and an area of land hauded by the well, varying with the size of, and the quantity of water in, the well, was assessed to the well water assessment.

All land assessed ander the well, whether water be taken or not, has to pay a water assessment of Rs. 3 per aero to Government.

If an aero of land with a well be rented, the rent to be paid is about Rs. 3 more on account of the well water (vide paragraphs 2 and 7, G. R. No. 2276).

- 38. In black soil, people seldom dig wells, and in Geradu land serious difficulties are not to be encountered in the selection of the spot and in the actual construction of the well (vide paragraph 7, G. R. No. 2275).
- 39. Except in the 15 villages near the rivor Norbadda, wells if constructed in other villages are not romancrative. I am therefore not in favour of constructing wells by Gororment in private property.
- 40. For the reasons stated in paragraph 7, G. R. No. 2275, temporary wells are not commonly used in this talnka, and it is therefore not necessary to encourage their construction in a year of scanty rainfall.

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- 1. Q. (The President;-You are Mamlatdar of Ankleshwarf-Yes.
- 2. Q. How long Lave you held that office?-For the last 11 months.
- 3. Q. Where were you before that !- In the Panch Mabals in the Kalol Taluko.
- 4. Q. Have you been in Gojarst all through your settlee?—Yes.
- 5. Q. Were yoo in the Panch Mahals District during the famine :- Yee.
- G. Q. Was the lamine very had where you were !- It as not so keen in Kalol where I was, as it was in other parts of the Panch Mahais.
- 7. Q. You say that "the creps irrigated from wells are sugarcane, ginger, wheat and vegetables; irrigated erops from wells are raired in the 15 villages mentioned above. In the other villages there are hardly any wells need for irrigation purposes." What is the reason for that?—Hecauce it is there conton soil. I have given my reasons in another pragraph. Wells have to be due very deep. Semetimes a strainm of earth called Keladu is streek which is very deficient to dig. The water supply is very deficient.
- 8. Q. You say "any how the people do not desire to construct wells in the villages of black soil as the produce of the irrigated steps is inadequate to the cost involved "f-Yes ; they do not pry.
- 9. Q. Are there not p'enly of wells exceptlog Goren-ment wells in the other taluts ?—In Surst and Bub's there is no black cotton soil and there are plenty of wells. In Anhlest war faluka it ey are situated in 16 villages only.
- 10. Q. You go on to say "The expenditure is generally incarred by the person who cultivates the land and he is bound to pay rent to the owner of the land whether he receives unter or not "f-Yes; it is not equitable that others should take this water; because these people have to pay arrestment whether they take it or not.
  - 11. Q. How many wells have you in your falula f-217.
- 12. Q. In the 15 villages?—Yes, there are only 4 or 6 in the caltre.
- 12. Q. Then you have got nowin D) wells in each villaged .-- In one village there are about to wells.
- 14. Q. I pather there are enough of wells for the villages f "Yet the people there are better off than other to give; they don't even become movey for constructing with.
- 15. Q. Ven my people in thack cotten will want to have more tucked You, it sy desire to have more tarks.
- 18. Q. Yen barnal operator 110 tanks in the talkin i Yene
- 17. Q. Res much de they intered \$10 arm.

- 18. Q. Are there sites for more tanks f-I have not studied that question. I do not know of any.
- 19. Q. Are these tanks generally very shallow !- Yee. they are silting up.
- 20. Q. When they are filled in the monocon, how long do they last before they become empty f-They last up to Marchil they are properly filled.
- 21. Q. You say in paragraph 8 "In the villages noted in the margin lands are water-logged and therefore additional distings works are required at Government cost"?—Some drainage works do exist.
- 22. Q. Are they working well f-No. I do not think they have done may good since they were made some years ago.
- 23. Q. Are they very old ?- No; they were constructed
- 21. Q. Do people object to the drains!—The people are divided in their opinion; some object to have more drains because, they say, the surface soil is washed away; other people where lands are further off are desireds of laving more draios.
- 23. Q. I suppose Government is remitting the regence on those lands which are water-logged f-Yrs, during the last two years they have done so.
- 26. Q. Are there any places where it might be possible to make large tanks to store waters—No. I have not heard of any.
- 27. Q. You say "It is raid that if hemp to sown and sentered on the land after some days it will supply sufficient manure." Do the people use of she largely for manure?—Trees who are accustomed to irrigate their tends ces it, but it is not largely used.
- 29. Q. It is not need where there is no irrigation f—No; only it see persons who irrigate their lands use it.
- 20. Q. They all know of itf-No; not all classes; because people, like, the delie, are not accord and to irrigation; they simply depend upon measons enga-
- EO. Q. Do you think it would be a good 14 log it famine relief labour was formed out to clean these village tanks f— It would supply sofficent labour.
- 91. Q. (Mr. Rajarstra Milr.)—Her many wells have been constructed during the last five years ?—In the facine you only one well was constructed.
  - 22. Q. The cliens are all o'l we'le ! Yes.
- II. Q. Are there forthilds force retracting more wells?— But the first exists but consists of Floric extreme stand I would be to some end that wells about the contracted tempes they will be page.

WITNESS No. 36 .- Mr. NABBHERAM MUNCHARAM, formerly Mamlatdar of Olpad.

Mr. 1. Q. (Mr. Muir-Mackenzie)—You wore, Mamlatdar of Narbheram Olpad ?—Yos. Muncharam.

2. Q. Do you know the Taluka thoroughly !- Yes.

- 10 Dec. 01. 3. Q. Have you over seen a drain ?-Yes, I saw one in the monsoon of 1900.
  - 4. Q. It was a short mensoon ?-Yes.
  - 5. Q. The drain was empty ?-Yes.
  - 6. Q. Could you tell me whether the people in the neighbourhood were satisfied with the working of the drain Yes, the only people who complain are those who are at the end; they say that the adjoining fields have been washed by the everflewing of the drains. It empties into the Kim.
  - 7. Q. The people near it complain?—Yes, there were various causes of complaint, one is because it takes too much water away when there is ue min.
- 8. Q. They do not want the drain ?-No, because it passes through their fields and they have to give up some of their lands for it; it is constructed, they think, to their prejudice.
- 9. Q. What is your impression of these drains ?-I think they are important and that they do some good.
- 10. Q. Would the surrounding fields be benefited by drains P—Yes, but the area is so far away from the drainage channel that the benefit will be minimised.
- 11. Q. Would you not take the drain into that area?-I do not know what the result will be, because the people are against it, they will resent it if the drain passes through their lands. Their leading members have to give up londs, that is why they complain; that was the conclusion I arrived at from my inquiries.

# TWENTIETH DAY.

# Surat, 11th December 1901.

WITNESS No. 37 .- MB. GOPALJI GULABBHAI, Mamlatdar of Jambusar Taluka, Breach District. Answers to printed questions.

Mr. Gopalji. 11 Dec. 01.

Paragraph I.—There has been but little, very little of irrigation in the talukus wherein I have served as Manulatdar, and so my opportunities of observation have been very limited. But I have had an acquaintance with cultivators, some of whom new and then raised irrigational crops in their fields, or who knew of their wants as agriculturists, and I had had apportunities of sometimes discussing the subject of irrigation with them. As Mamlatdar, I had had also an opportunity of knowing, in a general way, something about irrigational and other lands. It is depending on this so-called knowledge and experience that I have prepared the following notes on points Nos. 2, 8, 6, 7, 8 and 0 out of those mentioned in the Memorandum accompanying the Government Resolution No. 2275, dated 26th October last.

Paragraph II.—The gress area of this taluka is 247,519 aeres and 32 gunthas, and the culturable area is 172,350 aeres and 25 gunthas. About 2,000 aeres ont of the latter area are protected by wells, and about 2,250 nores by small tanks, and about 300 aeres more by other nominal sources of water. There are no Government irrigation works or private works other than wells in this taluka. The soil is of three kinds—(1) the Light brown or allnvial, (2) the Black, and (3) the "Besar" or half-way between the Light and the Black. The cultivation is not at all dependant on artificial irrigation. The average annual rainfall is about 35 inches and extends from Juno to October. During the south-west monsoon there is ordinarily no domand for other water. There are no crops narily no domaid for other water. There are no no crops grown in this taluka such as require irrigation excepting "Dángar" and "Kodrá" which in years of scanty rainfall require to be watered; for this purpose, tank water and well water is sometimes used when it is available, though it is rarely so available. About 150 acres of land are annually grown with "Marchi," Popper, "Ringni," Egglant, "Dangh "Onion and Tobacco, and they are watered to be watered against the law watered every suice the day. by wells. They require to be watered every eighth day. Marchi and Ringni are sown in the mouth of July and require to be watered in this way for four menths after the rains are ever, that is to say, from Nevember to February. "Dungli" is sown in the menths of Nevember and December and require to be watered for five months, that is to say, from November and December to April and May. Tobacco is sown in the month of August and requires to be watered for about three months, that is to say, from November to January. There is no irrigation revenue realized in this taluka.

Paragraph III.—Black soil is not favourable for irrigation. It requires much water and is difficult for weeding and for turning water and other purposes, which require the enlitivator and his men to go into it. It becomes hard and cracked in the fair season and takes in any quantity of water, and when saturated, it becomes so soft and sticky that one cannot tread over it without a good deal of incon-vonience. Small tanks in black soil hold water very well and mere thoroughly than those in light soil, which hold water, only if the bed is of gravel. In the village of Nadiad, which is a Bárá village with black cetten soil, there is a small tank of about 8 acres which is not deep and yet holds water throughout the 12 mouths of the year, notwithstanding it is much used by cattle. The population of the village is very small, but hundreds of outtle and sheep, which come to graze in the waste lands near the village, drink water thereof. In the village of Kapuria, which is also a Bárá village with excellent black cotten soil, there is a tank of about 10 acres, which was got excavated to a little depth at a cost of R500 two years ago, and since then the water therein lasts throughout ago, and since then the water therein lasts throughout the years. The tank of Kareli (a village with light alluvial soil) which is about 12 acres and which was oxenvated deep four years ago, does not hold any water at all, for the

bed being not a gravel one is porous.

High earthen dams can be made of black soil without masonry core walls. They will allow water to percolate for a time, but when settled and overgrown with "Kedra" or other grass, they become strong and will not be other washed away or cracked. Besides, so long as black soil is in touch with water, it will not become porous and will remoin sticky.

The tanks mostly consist of portions of low-lying ground, which are excavated, and where, on account of their low level, monsoon water rushes in from the surrounding high lands, often of a large extent and is collected.

When the land irrigated is black soil, there is not any When the land irrigated is black soil, there is not any demand for water during a season of average rainfull, for, the land, though it wants more water, rotains it longer. For example, tobacce which is grown in the month of August, does not require to be watered nutil November, if it is in black soil, while it requires to be watered in light soil, when the rain helds oil for a time. I cannot say whether the irrigated area in black soil shows a falling of in years of fair or good rainfall, or whother the revenue is on that account more precarious than in the case of other soil commanded by tanks, for there is not much of irrigation in this taluka. There is a desire on the part of owners of black soil rice-lands that there should be more of irrigation works which might water their lands when the rain stops short in the end, and which might ensure their rice crops; in such cases the construction of tanks would be as remunerative and as important as in other classes of soil.

remnnerative and as important as in other classes of soil.

Paragraph VI.—By district and village works, I mean the large tanks which are almost invariably to be found near the site of every village and the small tanks that are to be found in numbers in every village and are supposed to be useful to the surrounding field-owners and their cattle and to irrigate some of the nearest fields—rice plots—on occasions of scanty rainfall in consideration of a small payment.

11.3 "History" or "Kassar" on account of water, which called "Himóyat" or "Kassar" on account of water, which is incorporated with the land revenue proper and is fixed by the Survey Department at the time of the settlement. I believe the levy of this special revenue will be discontinued at the Revision Survey.

It is not known who constructed these tanks. The latter tanks near the village also were, I believe, assurated by the new settlers there exercises here size established the village or by those who postded them there. Then dog the tank and weed the earth to raise its lanks and to raise the village wite to erred houses on them. Every village site has invariably one such tank attached to it. There are also rumere a smaller tanks in every village "Sim" and they are very pointly ember the result of the charity of the reign us and the rich or the toult of the charity of the reign us and the rich or the toult of the charity of the reign us and others coming or cultivating land in the neighborhood. These tanks are all now contribled by Government. There are about 160 of each large tanks and about 500 of such small tanks in this fallage, There is in cultivation entirely dependant on them, in these are about 2,250 seres of had below them, the surrey was extent on which is fixed in consideration of the punicing capacity of the land, jointly with that of the water supply arounds for its irrigation at the time of the scatterious, and in the assumption that that untersemply will be malitained at about the same standard throughout the paintly of the leave. The rates for the use of the weer and if find are, as remarked above, consolidated, and occupants are under the liability to pay the full raise (whether the tanks are in order or not, and whether they have start in them or in the new in their holdings. The lands paying this assessment are almost entirely "Kihiti" or rice-plays.

The obligations of Gorernment, as a great landle of, to maintain in an efficient state these sources of water-supply for the use of which it clustees rent, are manifest. Contivuted that should not therefore he required to contribute any parties of the cost of requiring them. But some assistant a may, in faitness and in accordance with nears, but demanded from them; it will extend to a few days labour before the acting in of the moneon in orch year, for thing rathodes, making up banks were down by cattle traffer, cleaning small water courses and similar petty earth work sepairs. But so far as I know flovenment have not spent any amount on these tanks. Several of these tanks are not worth maintaining as irrigation tanks by Gorenment, and if ey might be left to the cultivators to a mintain or rate as they please, the lands below then being treated for accession as they please, the lands below then being treated for accession as they please, the lands below then being treated for accessional as dry crop lands. The larger tanks used for village water-supply are maintained at the cost of local funds, with such voluntary contributions or other assistance as som be obtained from the villagers, and, when occase on justifies it, by grants-in-aid from the Provincial assignment for the improvement of village-water-supply.

No new morks of this class have been constructed of late many. Direct Leval libraries do not undertake such works, and crivate land-outers also do not do so, though I have the med a sease or two of their digging such small tanks for their convenience—more for the extra mater of their fields to collect as also for the usy of their entitle and themselves, than for irrigational purposes.

Paragraph VII.—To total area irritated by wells, in critorry years, is about 150 eres, and 2,0.0 acres in a year of drought. Not a single new well mas constructed dering the last ten years, excepting 116 wells, which were constructed during the famine year and a few local found wills for driving purposes. Hugos 25,770 were given out as taken for a nervolling new wells during the famine year, the real ring of these wells have been left more or less incompare by the people, most of whom did not want to have more, either because the water of the wells was cet good or been see the wells a treat them purpose, though be complete, we have a location that me the wells a treat the remainered on a few wells by grants of taken—larger in an emit and on wordels treat tensors and about a derivable and have must and on wordels treat tensors and at the a derivable as a location that in this tellah, we so the chances of getting sweet water are surer than in one wells against the chances of petting sweet water are surer than in one will again and where the population is thick. Derived the first large and where the population is thick. Derived the problem of them have me some wells run short and some of them I wance in restricted to a well as kines that we always alont of mater need deposit (and a some of them I wance in some wells as a location of a larger and the water of the result that the water of a larger well as a larger and of the water and a larger and of the water of the result that the water of the result of the states of the result that the water of the states of the result that the water of the states of

Paragonal VIII.—There were complaints from the Mr. 1997 to perfect several village in this tribulate to the effect that inneaded water accomplaintd in their village site and in 11 He m. It is "Sir," that go be not the fields and from the village to another was render. I difficult to that rose in, also that the people soffered in leadth on account of the water, logging around it village site, which offere contained much light from manned and granule and granule where people theyel calls of rainre, and that mea as well as cault suffered thioughout the mineral and granule where people theyel calls of rainre, and that mea as well as cault suffered thioughout the mineral and vater on their delignounds. Alore all crops were also injured by the water legging. The following drainage channels were excitated to remove these difficulties about ten years ago:

- The Amanpor-Nalia! Channel about 6 miles in length, passing through the lands of Amanpor, Tundaj, Rampor, Kara and Nalia h.
- II. The Kern-Madalar Clanntl-
  - (a) passing through the levels of Korn, Panchalds, Sunblandanteen and Madafar,
  - (b) and the Jantinn-Malafar branch, presing through the lands of Jantrin and Malafar, both altegetler 64 miles in length.
- III. The Sindlar Channel drawing the lands of Sindhar.

The following channels were excavated during the famine year, and thereafter as famine relief works; they were also needed on the same account as the above ones:

- I. The Nabir-Unim-Kole-hwar Channel, produg through the lands of Nober, Units and hotesh
  - and the Dablia-Umra branch, passing through the lands of Dables and Umra; both altogether 6 miles in length.
- 11. The Uber-Dabha Channel, 2 miles and 749 feet in length, passing through the lands of Uber and Dabha.
- III. The Nolling-Nober Channel, 5,390 feet in length, passing through the lands of Nollina and Nober.
- IV. The Vad-Madefar Chennel, pusing through the lands of Vad and Madefir.
- V. The Vargetla Channel, 3,100 feet in length, passing through the lands of Vangetta.

Other desinage channels are still required, partly on sautary, but rhiefly on agricultural grounds. They are the following:-

- I. In Hankhi.—The draining rhannel to begin at the entiance of the village of Hankhi, where water accumulates during the mouseon, and to end in the river Dhadhar;
  - this mould save the crops (cotton) of the ficiles on its sides from descriction when the mean are heavy, for they remain under mater; it will also be useful on smitary grounds; this chance would be of about 2 miles in length. About three other smaller chancels, each of about a mile in length, are also wanted in the fields around this sidage, to be as ful to the regile of this village to will as Gajera, Uchiel, Vellam and Jafarpara; the chancele to end either in the Mariael Khadi or in the Khali of Ragnad.
- II. In Halapura This rillage hadly wants a clausel from it a sillage site to the Dhadlar—a distance of less than a mile—to ease its crops from sleet trection during a year of even cidinary rainfall.
- III. In Kace or i Val A channel is reversely all along the modifiers Val to Kara- of about 3 miles in length. This would be useful to the surstruction fulls; it will discharge itself in the Array, constitutional, near the sillage of Kara.
- IV. In Stranger, Small changes are consisty in the form of the a lispeach School is necessary in practice from the Aller in the all confidents for the Atompostical Confidents Smith.

Mr. Gopalji. For the last half a dozen years, the rainfall has been comparatively light in the taluka, and hence there is not 11 Dec. 01. at present a great ory for channels, but the nbows-mentioned ones would be assful. The majority of the people want thom.

Those channels would not be very expensive and their cost should be met with from the local funds, where they are useful from a sanitary point of view; and from Provincial grant, where they constitute useful improvements. They are likely, in my opiaion, to result in an increase of rovenue, as also to ensure prompt payment of revenue and to lessen the burden of the cultivator, who would be easily able to pay his assessment, when he will be saved from injury to his land from water-logging.

There is a complaint in some of the villages of the taluka that the drainage channels aweep away the fertila amface soil and leave an inferior one in many places, full of "Maradias" or little white gravels, of which lime can be made, and I have reason to bolisve that their complaint is partly correct. Fields which formerly grew "dangar" and "jnar" or wheat are now not fit for anything but cotton. Formerly the water collected in the low-lying lands and it was used to irrigate the drying fields of "dangar" when the rain hold off or ceased or was not sufficient. Again, the grass and other natural growth remaining under water decomposed and served the purpose of manure; "juar" was sown in the fields when they became sufficiently dry, and those that were not dry by that time were later on sown with wheat or gram. Instead of all this, now the water at once flows away by the channels; the result is that the fields adjoining the channels are in several portions washed away and cut up and they become often unfit for anything; the others also suffer more or less. Grass and other useless plants grow apace, and weeding costs a good deal. Besides the time for sowing comes at the same time in all these lands and it is short, and hence the people do not get that long time for sowing as they formerly did, when there were no such channels. Formerly they sowed the light brown soil in this beginning of the monoon with bajri, kedra, cotton, etc., or the black soil, in which water did not accumulate, with cotton, etc., and when they were free from that they took these black soil fields in hand where the "varop" was late on account of the accumulation of rain water; whereas now the "varap" comes on at the same time on in the other fields, and hence there is less time available for sowing.

The people say, they gained a good deal for a few years after the channels were dug; but now they say they are losers. "Dangar" crop has been reduced to almost ail in those villages and its place as well as that of 'jnar' and wheat, has been taken by cotton. which, however, does not now turn out successful on account of the irregularity or insufficiency of the rains, and which is not so paying as formerly owing to the reduction in price.

During the last famine year I was told by some people of Jantran that their channels should be filled up, so that they might serve as famine relief works and might also do good to them. The complaint is very strong in this village, because the rice-erop which formerly grew in abundance here has disappeared a few years since, partly because the rains are not heavy, but chiefly because there has been too much draining off of the useful mouseon water. In the rest of the villages, there is either no complaint, or what complaint there is would disappear with a heavy rainfall.

Such channels prove more useful in light soil than in black, for if the water is not drained off in black soil, the land can be sown with later crops such as juari or with wheat and gram, etc., when the water dries up; but in the case of light soil fields, if the water is not drained off, the time for sowing bajri, kedra and cotten passee away, and when the "varap" takes place, the time for sowing is over; the light soil coes not grow rabi crops, each as wheat, etc.

It may be mentioned that these channels are merely drainage channels constructed to carry away moreon water, and they are not irrigation cauals. No water is drawn from thom for irrigation, and they contain no water after the close of the monsoon. Some of these channels, on being repaired and provided with wasto woirs, can be at a little cost transformed into large lukes for storing water, but I do not think they will thoroby serve any useful purpose. An experiment may, however, be made with part of the Jantram-Madafar branch channel, about which there is a great complaint and which may prove of some use.

Paragraph IX.—The following tanks were excavated as famino relief works during the last famino. They are all

large tanke useful for miscellaneous purposes to the people, but not used for irrigation.

				Re.
1. Dabha		•		1,12,000
2. Tankari			•	1,44,000
3. Shigam				1,21,000
4. Jambusar	٠.	• ′		94,000
5. Karli -	•	•		41,000
6. Kalak				11,000
7. Dolia				6,000
8. Pisad				8.000

Tank No. 7 has decidedly improved. As regards the rest it appears their beds have not been "formed"; for though they are deep, they do not hold water as well as some of the shallow tanks are known to be doing. None of the beds are, however, perons to a great extent, and a little citting will, it is supposed, improve them. These tanks have undeutedly improved the water-supply of the villages; the four tanks of Dabha, Jambusar, Tankari and 90 A 70 A 72 A

Shigam are large reservoirs which will be useful in a year of 34 A

drought; but for greater usefulness and to serve their purposes in full, masonry waste-weirs should be provided for all of them excepting Jambusar, which has already got them. Shigam and Pishad taaks may be said to have gained nothing by the excavation; for the former, while it gets water by one way, loses it almost entirely by another—both the ways being in part the same; and the latter has no income of water, having probably lost it by the now Umm-Koteshwar channel. The big tanks of Dabha, Tankari and Shigam will, I hope, in the long run, be utilized for irrigational purposes also, if they are furnished with wasteweirs and maintained properly, for they will then contain an abundance of water much more than would be required for all other possible wants of the residents of the villages.

I am of opinion that the big ravines of river Mahi to the north of this taluka in the limits of the villages of Vedach, Piludra and Kareli can, at a comparative little cost, be converted into vast lakes and be utilized to irrigate the extensive "Bhatha" or alluvial lands below, in which Babul trees floorish and which can be reclaimed without much difficulty.

#### 11.

- 1. My answers refer to the Jambusar Taluka in the Breach District. I have been Mamlatdar of this taluka for the last three years.
- 2. The average rainfall is as follows in each month of the year, the average being of the last 10 years:-

Name of	mont	b.			Rain	fall.
					lnohes	Cents
Japuary	•	•	•		0	1
Fobruary			•	•	0	11
March .			•		0	1월
April .					0	•
May .					0	2
June .	•		-		7	83
July .		•			13	18
Angust		•			7	13
Soptember				•	4	34
October		•	•		1	52
November			•		0	28
December		•	•	•	0	1
					34	441
					-	

3. The following are the obstacles to the extension of irrigation in the taluks:—

#### (a) Sparsity of population-

The taluka has an area of 3862 square miles. The population is, according to the last consus, 61,846 senls. Thus it comes to 160 to a square mile; a large portion out of this is comprised of non-agriculturists, i.e., tradesmen and labourers. In the villages of Kanwa, Kareli, Filulta, Vedach and Gajera, where there is something of irrigation, the population is four times the average of the taluka, being 640 per equare mile, and it consists almost entirely of agriculturists.

(1) The unwital lidy of the black eatten wit to imiga-

The greater part of the land of the taluka le Nack coren wil. There are lotally 57 villages, of which 22 are "Barn" or reaccost villages with extircly blad will get villages with extircly blad will aril (see-served ROJON), and 46 see "Non-Barn" villages, the greater post in of the land of which is there exiten you being seel, fasterement 112.02.420), and 19 villages only with hight from each insertment RILEAN). This the greater portion of the blade and financed of

(c) Lail of expital for the initial expenditure and of funds for the more expensive cultivation of irrirated stops-

The initial expenditure would be-

R foo fer a well.

. 137 for a pair of bullocks.

23 for Koe-Varni, etc.

R (75

The seeds cost a good deal for come of the liriga-ticual errys; the piriog of a "Kos" c. ets maily one rupe a day. Most of the people are too port to incur this expenditure.

(d) There are other reasons also; for example,

- There are other reasons also; for example,

  1. The librarian tenute, under which each Klatedar
  helds large holdings; he cultivates the test
  lands of the librar himself and rents out the
  rest. The tenants, even if they have the means
  which they generally never have, do not dig a
  well or make other improvements in their
  land, for they are annual tenants, and if they
  make any improvement, their rent is enhanced
  or their leave is cancelled. Out of 65 villages
  in the taluka, excluding the ham ones, there
  are 55 such Blagidari villages.

  11 Inether village also the holdings are large and
- are 55 such Diagidari villages.

  11. Inother villages also, the heldings are large, and so the occupants do not find it necessary to labour hard to maintain themselves, and they do not therefore take to irrigation. They raiso enten crops which do not intail much labour and which yield agreed uniturn. An acree of first class exiten land yields more than 18 in aunds of and-cotton, which means nearly 75 injects. Why should the cultivator than tell for an irrigational crop which involves more trouble and more expenditure and is more trouble and more expenditure and is net likely to pay more?
- III. Again 43 per cent, out of the total occupied area of the talula is Inam lend, and the expression of like to exert themselves laving culy a small amount to pay to Government in the case of these lands also, the great per-tion is in possession of annual tenants who would not make improvements there a.
- IV. The greater portion of the cultivating classes are Kolls, Hajputs and Bollorss, who are not four of imignies.
- V. Sweet water is rare in the greater part of the talula, which is great obstacle to irrigati. a.
- VI. Lastly, the ini-chierousness and lariness of the lower classes—agriculturists as well as others—who steal and injure the asluable irriprtional cusps: this lesps back a good deal of irripation in Jamhusan town for example, where there are minorious sources of mater estable of irrigation.

i Under the Sarrey Settlement, rubanced assessment is leafed and land, millibare injuried from any source of water, whether a well, a task or a water-cure, etc. In case, where this source of water use it led upon as a present one, and appeared to lave been used, the Survey is partnered und discrepanced to late the under the partners in additional assessment proper, and it is forned to a case in which a mely for which such assessment was lasted, were not of regain, and get the enhancement was lasted, west out of regain, and get the enhancement was a terminol, and of pumenous cas a of tanks, etc. where thought we assess measter for impation, the enhancement was certified to be taken. I also know of a few some wines and enhancement was certificable in any time where the first well as the water of a few some wines and enhancement was a certificable in any time was not distinguished as the water of a few some and materials, wells, takes, etc., which were not a core of materials, wells, takes, etc., which were not 1 Under the Sarrey Bettlement, enbanned arecement by

su assered for, were to be elargel for at the rate of 8 Me fin, ela rupce per "Kes" whenever their mater was med, if they were in Government land. A "Kes" generally unique. It Desert, alors were released, that is to say, the full "Kes" rate was not levied, but a core or less partial rate only, particularly in years of sensity rainfall, when even release was levied in some instance.

To ante do not in any case extend traigation at their can ect to the lands in their travers. for their terrory is annual. In one villege coly, there are a few permanent terants, but they do not make an heightenesses, for they are affined of their landleds, and there is resum indeed that they should, for even a sub-distret of one of these landleds who constructed a well in one of the fields in his Ist dienla who constructed a well in one of the Felds in his share—it gunthas assessed at 110-12 0—1 as been force to per Hit to his principal, on account of the existence of the nell. I do not think that the existing provisions in this respect are sufficiently liberal, but it is expected, they would be after the review Survey, when oll such sufficient month will be removed and only further by a general sufficient whose though I do not understand on what prively be and evidence the aub-cil capacity of the land will be determined. The system of sub-neigh rates for brightin adopted at the original Survey did mischief, in my opinion, by deterring people from digging more wells.

As regards lacicla wells made in Covernment land after the original Survey, special rate was levich for their use in the same war as in the case of tanks, sirers and water courses, but that practice was stopped under Gorenment Residution No.588, dated 18th duty 1884, liercune Department.

The Commissioner, Northern Dirlsion, under his Gujarali Circular No. 6, dated the 15th July 1885, hand in-structions to the Collectors to the following effects:-

Certain wells being out of order and useless, no per-Certain wells being out of order and useless, no per-manent rate was charged on their account at the eriginal Survey, but when such wells use exel-fer irrigational uniposes, special rate was charged at list per "Kee"; but it must be remembered that before such nells are made useful for irriga-tional purposes, they would cest same frontle and expense to the cultivators, and hence no-thing should be charged for their use in future. This order is also being followed.

This order is also being followed.

6. Leans under the Land Improvement Act are not friely taken by the people for the extension of irrigation. The reasons are partly the same as are mentioned in paragraph 3 sgainst the extension of irrigation. Irrigation is not required by people in some cases, while it is not profile in other easer. The people therefore do not accept a han to extend irrigation. Again a cultivator does not like to henry acids and bullocks are to buy a neighbouristicle, as also to buy seeds and bullocks are to buy a neighbouristicle, as also to buy a neighbouristicle, as also to buy a neighbouristicle, as also to buy a neighbouristicle, as also to buy a how a bullocks are to give easts dimars, etc., but he would not, in the majority of cases, henry delt to construct a well; it is beyond his an iteratading to do so. Bestits, he does not like to be a deluter to Concentration who will brook no delay in payment and also would receive it in m hom summarily—ejecting him on his lamily from his learth and field and selling him up, so to say the would prefer any creditor; by the remain to you to say the would prefer any creditor; by the remain to you are a solly, while he wants it oftense for doesetic purposes; and if he made a wants it oftense for doesetic purposes; and if he wants are the "Sarkar" and stude in the wants it oftense for doesetic purposes; and if he was remained in least for more than from the returned as a present of inferior mentional his bank returned as prison of inferior mentional his heart from the first mental and the product of the financial difficulties, and they must delt in a way unknown to others; eachiers likewise keep such transactions unknown to others; eachiers likewise keep such transactions with a work from thouse for the far is a first in any thin and thing on artificial difficulties are known by sile. The majority of if query for a great man thing on artificial difficulties are known through, not in a safety for a series of their ball of a soft lie of the same transac 5. Leans under the Land Improvement Act are not freely

I All frame to be well and a meteral

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- 2. Small leans to be given in the first instance to make trial borings: not more than half of the leans to be recovered if the trial fails and in reasonable instalments, not to exceed in any year one-oighth of the amount poid by the grantee as land reveaue to Government.
- 3. If the trial is successful, a farther large loan to be granted and to be recovered in reasonable instelments—the amount of the instalment net to expeed in any year one-foorth the amount paid by the grantee as land revenue to Government: if there is a failure to obtain sweet water, not more than half the grant to be remitted.
- 6. I do not think that in this talake, the extension of irrigation will tend to injure the remaining oultivation by attracting its cultivators to the irrigated tracts.

There is a desire evinced by the owners of rice-plot lands to have means of irrigation extended to their lands.

#### Tanks

Paragraphs 23 to 33.—There are numerous small pends throughout the taluka, the waters of which are supposed to be useful to the adjoining fields for irrigational parposes, and on account of which those fields have been paying a somewhat higher assessment: but account of them are netually used for the purpose, for they berdly centain sufficient water. These pends are eld ones and are now silted up and no monoy is spent on them either by Gevernment or by any one else. Besides, I do not think, these tenks were at any time systematically aced for irrigation: they were occasionally used when the later rains fell short for the "dangar" orops. There is only one tank in the talaka, namely, that of Survey No. 14 of Jantran, 3 acres and 19 ganthas, which once used to irrigate the surrounding rice "Kiardas"—8 acres and 3 gunthas in extent, assessed at R71-12-0 out of which R4-8-1 represent the "Himayat," but this tank is now not so used, because it has silted up and is out of order and on account of other reasons also.

The following are the details of lands that are pretected by tonks and cimilar sources of water according to the Sorvey Department, who at the original Survey ordered the levy of permanent special assessment on their account, the said assessment being consolidated with the land tax-

2	Total Survey Numbers.	A. O.	Himsyst or special nerces. ment.
			R. o. f.
Tanks	. 1,133	2,252 13	1,112 11 0
"Voho" or water-courses "Kaos" or drainage-c	. 45	69 23	35 1 7
nels	. C	8 2G	4 13 8
Khad or hollows	. 60	159 50	71 7 8
"Marg" or road land	riog	78 3	33 14 5
grazing lands	· · · · · · · · ·	1 11	0 13 0
Total	1,317	2,669 35	1,583 1 7

Whenever there is any water in these so-called sources of water-sapply, and it is needed for irrigation, it is raised by artificial means by human agency and then carried by a drain to the fields.

#### Wells

- 34. (1) The average depth of permanent wells is about 50 feet in black soil villages and about 60 in the rest.
- (2) In wells of this depth the water-supply is from spings and is not liable to fail even in a year of drought, though in the sea-coast villages it becomes, in some cases, more or less saline in such a year. In these latter villages I have seen a step well which neither ran short nor in the least hrakish in the famine year, when all the wells around it within a distance of five miles were affected.
- (3) The average cost of constructing such a well is about R800.
- (4) A well of the sort described above losts for a century and more, if ordinary repairs be executed occasionally, such as the catting of young trees growing on its sides, the filling in of bird-hules in the walls, and the repairing of ordinary injuries to the mesenry.
- (5) The water is always raised by means of a "Kos" which is drawn by a pair of bullocks.
- (6) The average area attached to a well and commanded by it is 8 acres.
- (7) The average area annually irrigated by wells is 150 acres.

The largest and hest well in the taluka, is in the villege of Novar, four miles from Jambusar and about the sams distance on the south of the river Mahi. It is at less a century old, and is situated at one end of the villege tank. Is is about 50 feet deep and is abeat 20 feet in water. It has a diemeter of 26 feet, and 12 "Kos" can ply under it, more than 20 acres of land are commanded by the well, and they pay a total water rate of 55 rapees a year to Government. But only about 5 acres of land are annually irrigated out of the 20, and not more. It is, a well to which, hy way of an experiment, a small steam pamp may he attached for the purpose of irrigating the surrounding lands. The well perhaps shows that artisian wolls are not impossible in these parts. The well is going out of repeirs from the top, and no one cares to repair it. In the Government records it is noted as a "Sarkari" or Gevernment well.

- 85. Irrigation increases the value of the produce or land-
  - (1) by one and a half, giving a net profit of about R45, by rendering it possible to cultivate two harvests instead of one.
  - (2) by two-fold, by leading to the substitution of more for less valuable crops or varieties;
  - (3) by about two-fold in a-
    - (a) year of nmpls rainfall;
    - (h) by about the same in a year of scanty rainfall;
    - (c) by nothing in a year of drought, for the cost is very heavy and the yield is basely eneagh to maintain the cultivator and his cattle.
- 36. The total annual value of the prodoce per acre of land due to irrigation is-
  - (i) about 45 ropers on the average of a normal term of years; and
  - (2) about nothing in a year of drought.
- 37. The average annual rate per acre paid on account of irrigation by the cultivator to the owner in the shape of enhancement of rent is 10 ropees, and by the ewner to Gevernment is 3 rupees.

Government charge the rate on all lands which are commanded by the well according to the view of the Survey Department, whether they are irrigated or not.

The owner charges the rate on all lands which the cultivator takes up with intent to irrigate.

38. Serious difficulties are often encountered, both in the selection of n site in which a supply of water will be obtained and in the cetual construction of the well.

The oultivator selects the site of a well either with the help of a Brahmin or some such ether persea who is a "Joshi"—an astrologer — or is versed in the popular estimate in the science of the selection of successful sites for wells, or with the help of relations and friends who here built wells er sess wells built. In the former case he takes the man's word and begins digging, and if there is a slight indication of his word proving troo, e.g., the appearance of water at the stated depth, no matter brackish, he goes on hopefully. In the latter case, he and his friezeds select a site which is usually any piece of low level ground in the field, where water accumulates in the measoen or which is near or in the direction of a successful well thereaboat, or which is near a tree of a particular kind, such as the Jambuda, the Sanada, the Vad, the Mahuda and the Umra or which is near by a hush plant of particular kinds, such as the Kamei and the Chini-Bordi Nene of these methods is hewever reliable, for numerons wells on sites approved under these systems here turned out failures during the famine year.

In diggiag a well, percelation water generally appears at a depth of about 15 feet; the sides of the being through which the water perceletes are all moist and they become more meist an account of eareless taking out of the mad and water from the bottom. On this account the earth from the sides begins to slide in unless it is hard; in some cases the earth being of a loose sandy moold, it falls in of its own accord in large blocks or in henps of sand, and injures the workmen below and readers the work impossible or at the best a costly and ill-success. To prevent this result, the caltivator reserts to the construction of what is called the "Toendi". In the first place a circular ring of "Samda" wood, called a Chakkar, of the circumforcace of the well is got prepared by a carpenter; it is about a foct or mere in thickness, and nearly two feet in breadth; on this is meuated black-earth and brick work, and when the

whole read es a height of along 12 feet, it is I were I down whose tractors a longist to me it as two it is a more to me in the election belt, at by the shifted weakness who are called "Coalars" and are lightly post for their work. Further dipolic is done and the "Toonti" is lowered. This prevents feither falling in of the earth from the sides, but irrepases the cost of the work.

but increases the cost of the work.

When probability water appears, the cultivator becomes hypital. It the mater is trackin, he thinks it to only term taking water and kepes that it would improve farifier down. So he proved dispiner; then he constructs the "Tourdi", and the work thus taken in land seriously is provided with seen if the waters do not improve, it ough it is abandored before it is fully carried out. I know of a term case, in which wills have been abandored in this way. I know of two cases only in which the ewhere contract in a light the work had to be abandored from the hypothesis abandor to the falling in of heaps of sould from the riles.

I do not know of forcement or a Local B dy ever

I do not know of Generoment en a Local B dy ever effection as frame in the skap of expert advice or trial britism or the was of terms took. Such advice would of our rashe result if of a reliable value and on this given in the skap of trulterings and the wee at leving tools.

During the last faulty several people used a botton of portus called a "Shar la" to improve their wills, but it governly met with an identeess, instrument as though it troughtent a engines supply, rendered it too saline to use.

- Only one well was proceed they being thes level; it was More, and of hardish and it improved and horano anest on being level.
  Only the other day I med the tool in a Level Fund well II the seq with second the notifies a few full min a copies supply of potable nature. I also improved another Level Fund well in the same way two years ago.
- 52. I am not in the farcar of construction by Greens ago-ries to wells in land which is private property. In the fast place the well might form on the he a failure Secondic, it will east to the removed result double of this it would be a private landscener. Thirdly, the landscener would decline to use it permanufly the relations it one year and not use it the rest. So the well will not pay. Frankly, it might contenance again to district in the mind of the landscener that Government would increase his land-tax at the next settlement, if he used its water. tax at the next refficient, if I e well its mater.
- An experiment in the direction will not lowerer to thrown away in a village like thiers where the population is of Patadars and is thick and insustricus and skillful.
- All Telaporary wells are very rurely used in the telelat. If they are in a sell where the siles do not fall in they are a very good protection against drought. I have seen only three such successful velle, one of which has been in castemen there three years and is not for irrigation; but such cases are rare. A liberal grant of trians will encourage the digging of wells of this sart, and if a necessary, the against the first property the contract of the sart, and if a necessary the against the construct of the sart, and if a necessary the against the construct of the sart, and if a necessary the against the construct of the sart, and if a necessary the sart sart is not sart to be successful. ful, the owners themselves will construct them patta tefere
- 1. Q. (The President.)—You are Mambalder of the Jamlusar talala ?—You
  - 2. Q. How long lare you been there!-Three years.
- 3. Q. Where were you before ?-I was in the Panch Mai als district for a short time. I was also in the Kaira Chiri...
- 4. Q Yes have be a in the Jamburas taluka during the families -Yes.
- 5. Q. Dil you lose many people!-Yes; we did.
- C Q. You have very little irripation in that talula f-Yen very little.
- 7. Q. What do you irrigate f-Bice and Activa.
- 5. Q. (Ur. Rletten.)-What is Leten ?- A small millet. We also trighte chilles, brinjals, and onious.
- O. Q. (The Presidents)—You say every village has got a tank's—Yes, for democile purposes,
- 10. Q. Not for irrigation f-No; they are ebledy for Emiet e partiere.
- 11. Q. You say, "there is no cultivation entirely dependent on allow (tanks)." It must be helped by rain?—Yes, it ravely requires I tip from irrigation.

  12. Q. All these tanks were dry in the famine time?—Yes (all these tanks were dry in the famine time?—Yes (all the entire).
- 13. Q. Did they prow any crop inside the bed of the table?—Yes, make with we'll nate?
- 14. Q. Young, "the obligations of Givernmentas a great landled to maintain in an efficient state there some edvatroupply for the use for which it charges rent, are manifest"? Dept. 12 understand that they have certain its literast to the upleup of tanks?—Some understand that they have efalit ; rome dint.
- 15 Q. Tiere is to power to compel them !- No; certainty not.
- IC. Q. You say," or far as I how, the Germment have not spent one money on these tanks in the telular. Second of the stands of the stands of the ministration of the ministration of the ministration of the ministration of the paper. Where do you demand that were taking places. Where do you demand that we receive, it, it a tank page discourage then then his 10, 16 de Die grantlem is to um it maintainen ft.
- 17. Q. Where do you draw the line at 18a Di-Yers that would be the figure.
- the G. Why proposal would out and the Softwike for Test near historican fourth for more.
- 25 Q You bere to will at alf-We large let of e. led it they in their to I fer impeten

- 21. Q They were worked in the famine?-Yes; even old wells were repaired; many were quite out of order.
- on. Q. You say," no new well was constructed during the last ten years excepting the 116 which were constructed during the famine year." Were they Lacheha wellef-No; all pulka.
- 23. Q. How many wells were there before?—The total number amounts to 1,000 now; about 10) are out of repair; a out 400 are brigation wells.
- 24. Q (Mr. Mair-Marlenzie)-Are they in use at present?-Yes.
- 23. Q. (The President.) Too ery 116 were constructed during the famine year! Year; and 200 were built before the famine year.
- 26. Q. You only irrigated 150 acres before the famine? --Ye+.
- 27. Q. You say Be 39,730 were given out for falari; was it for these 116 wells !— Yes.
  - 28. Q. That means Rs. 331 for early !- Yes.
- 29. Q. You say the majority of those wells have been left incomplete by the people in Yes.
- OR. Q. I suppose they paid back the tal seif-No; the crops are too poor; they will pay eventually.
- 31. Q. You recommend an increase of the number of wellst-Yes; for years of drought.
- 22. Q. Fron although they are not used between famine times F-Yes.
- 33. Q. Yen suggest that "It is possible and desirable to stimulate the construction of new wells by grants of takuri." Yen propose "free of interest entirely "?-
- 31. Q. You say, "during the drought of 1000-1000 to water in term wells can dry and second them became more bracklet." Where was that i-On the sea cost
- SS. Q. They did not vet any benefit from discounting the wells?—No, they generally not sait mater, though they not a to recept me supply.
  - 13. Q Test spoil-1 the welle?-Yes,
- 27. Q. You say 5) nells were alandoned eving to this? Yes
- 22. Q. In printing the many, that the people inflored is teach on a consist of the materiagning since the fact in large state of the materiagning to be going of the first printing that the could be being removed one are large it distanced and a
- for Q. You exprise a dishiful cplain about them had no expressed to the properties of regard to exception of the properties.

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- 40. Q. What do you meen by varap ?- Dryness of the soil; that is the mischief of the drains.
- 41. Q. You say the channels dry too fast ?—Yes. From almost every village there are complaints that the drains soon off the surface soil and do a lot of harm; also that the sowing time is now too short; formerly there were two classes of land—wet and dry; now all are dry, and have to he sown at the some time.
- 42. Q. Could not the droins be regulated by putting in sluices P-Yes; I think so.
- 48. Q. You say, "The people say, they cained a good deal for a few years after the channels were dry but now they say they are losers. How long is it since these draintoge channels were made?—Ten or 12 years. They were made in 1891-92 and in 1891-96 more lands were taken up for cultivation by means of these channels.
- 44 Q. Before drought came did the people begin to complain of these channels ?—Long before that.
- 45. Q. If the rains are heavy again those channels will be useful and the complaints will cease?—Yes; the complaint is really a serious one in only one village.
- 46. Q. How many villoges benefit by it?-About 12 or 15; we went more drains yet.
- 47. Q. (Mr. Muir-Mackenzie.)—Do you think, in spite of these compaints, it would be advisable to extend the number of drains?—Yes.
- 49. Q. (The President.)—You say "In my oninion the big navines of the river Mahi to the north of this taluka in the limits of the villages of Vedach, Pilnden, and Kareli can, at a comparatively little cost, be converted into vast lakes." Is that area in black cotton soil country?—No; it is alluvial soil but there is not a single acre macultivated in those villages. All the land is valuable, and what irrigation there is, is in those villages. At present the people pay at least Rs. 15 per ocre for unirrigated lands.
- 49. Q. The Mahi river goes down to the sen; where would you make your bunds?—About a mile from the high bank.
- 50. Q. How many acros do they irrigate now?—It would be a thousand acros.
- 51. Q. Are the people rich?—There is good olluvial fertile seil and a thick population; there is not a single weste ocre in the villages.
- 52. Q. You say in paragraph 4, "nader the survey settlo ment the onhanced ossessment" is levied on oll londs which are irrigoted from ony source. Do these peeple apply for remission if the source censes to exist?—No; only those who apply for remission get it.
- 53. Q. I understand that it is not the habit to upply for remission?—Yes. For some reason or other they do not apply; the tank assessment is so little that the people do not core to trouble about it or perhaps they don't know the rules. I know of some insteaces in which remissions have been granted and of one case in which it was not granted.
- 54. Q. You say looms ore not freely taken up by people for irrigation?—It is only the rich that make wells themselves; the poor do not inour dobts to make wells.
- 55. Q. Do you know of eases in other districts where grants are made for wells?—They are mode here in our telukn as well as elsowhere, but the people do not like to run into debt for moking wells in this part of the country where they are not fond of irrigotion.
- 56. Q. Have you served in any other district?—Yes; in Knira, where they incur dobts to moke wells.
- 57. Q. Yon soy, "in ordinary years the people look npon a person who necepts o Government loan as n man of inferior meons"—is that the case P—People do not like to toke leans.
- 58. Q. (Mr. Ibbetson.)—Loans from a bania would have the same effect?—They can take from banias secretly, nnknown to others.
- 59. Q. (Mr. Higham.)—If there is no ossessment on small tanks as you propose, do you think the people would clear them out?—I don't think they would, because there would be so many sharers in the tenk.
- 60. Q. They would have no reason to complain that Government did not do it?—When they come to know that it is to their benefit to keep their tunks in repair, some of the agriculturists might do it.
- 61. Q. Yon don't think they would do it ordinarily?—No, I dou't think so.

- 02. Q. What sort of repair do they require?—A little removal of silt, repairs to the bonk. Loth can be done of the same time.
- 63. Q. Is it done annually or every ten years?—Once every five years; sometimes every couple of years.
- 64. Q. You could not make them do it?—It would be rather difficult. In the cose of good rice lands, the people would do it of their own accord. I have seen one village in which they do it canually.
- 65. Q. The drains have led to cotton being substituted for nice?—Yes.
- 66. Q. Cotton is o more paying crop?—Yes, it is very profitable. People wanted the cheanels for the purpose of raising cotton. It has not paid for the last half a dozen years, os the rains are not sufficient. People complain that formerly they raised rice, junn, and wheat; but now the soil is not fit for these three crops. It is only fit for cotton.
- 67. Q. Yon say an acre of first class cotton lond yields more than 18 manads of seed cotton, which means nearly Rs 75. Why should a cultivator than toil with the irrigation of a crep which involves more trouble and more expense? I understand the cetten crop is a crop most suitable to this country?—Yes; cetten pays best in Broach.
- 68. Q. Why then is there an objection to the drains? Did they complain before the dry years come?—No, they did not.
- 69. Q. Before the dry years came they liked the drains?—Yea.
- 70. Q. And they still want more drains. You ore now making more drains?—Yes.
- 71. Q. (The President.)—I think you said that the land hegon to deteriorate before the famine year?—Yes; there was a complaint against some of the channels; not against oll the channels. The complaints are justified to seme extent, for in one place the soil has been washed only, particularly from the fields near the drains.
- 72. Q. You don't think complaints in other places are serious?—No, in other places they are not serious.
- 73. Q. Would not people be able to keep water on their fields by putting up little bunds ?—Yes, they would.
- 74. Q. They have not done that because it would cost much trouble; they want Government to do it?—Yes.
  - 75. Q. They won't help themselves ?-No; that is true.
- 76. Q. I suppose these wells which were constructed all over the district would not be worked in dry years?—They would not be worked in ordinary years.
  - 77. Q. Hove they cattle to work them ?-Yes.
- 78. Q. (Mr. Ibbeison)—What are tanks used to ir rigate moinly in Broach?—Simply rice.
- 79. Q If you made an irrigation took would the caltivator grow rice or catton?—He would grow rice, but first he would have to make kiaris.
- 80. Q. You have got a certain number of irrigation tooks already mode?—Yes, I hope they will moke kiaris under four of those made lost year.
- 81. Q. Does cotton pay better than rice?-Ordinarily rice pays better than cotton.
- 82. Q. I understood you to say that cotton paid better than rice?—What I meant to say was that excellent cotton lands pay well, but ordinarily vice pays better than cotton, especially when it is supported by irrigation and so mode more scenre.
- 83. Q. Yon say you don't think there is much hopo of the people mending those small tanks oven if the assessment was remitted P—No.
- 84. Q. Snppose Government made over the assessment to the Local Beards and gove them the water revenue to keep up the tanks, how would that work?—That would work well.
- 85. Q. Do, yea think they are capable of managing them?Yes, in the case of a very few tonks.
- BG. Q. Why very few ?—I think very fow of the tanks would pay the Local Boards to meintain them.
- 87. Q. If tooks could not be kept in order by the Local Boards how could the people keep them in order themselves P—They can supply the labour themselves and do the work more cheaply.
- 88. Q. Could not the Local Boards get the people to help them?-Yes, to some extent.

- 55 Q. They would be some likely to do it than the Public Works Department for Your some Likely to get the line smale
- po Q. (Me History)-World He Poblic Weeks Depatiment do it be the result means or it means of the secole!—By means of the people; ther would have to pay their sean people as well as other people.
- 21. Q. (Me. River s.t.-Would not the Local Read to able to make a small tank par where Government could not Fill a think Local Boards on M make it pay.
- 52. Q. About wells; you say it be prairie to a great extent to increase the number of wells; do you refer to the black out mould in only to allustial f—Chieff alluvial and likely cotton and where water in sweet.
- 93. Q Dagen get meet mater in block e ternsell F-Yes-13. Q. Have seen seen the people irrigating all surface ereps by means of wells in Broach in black cutton solic-Yes, I have, in villages in the west where the soil is pall a black cutton will.
- 25. Q. What sort of crops do they sow? Onions, ground-nuts and wheat,
  - 20. Q. Does that pay 1-Xes.
- 87. Q. Do they irrigate steadily every year?—No; they do an acre or two; people all a have tried it do it; ordinally they do one or two acres in every village.
- 98. Q. What is the proportion of alluvial soil to black cetter well?—About one-third light brown and alluvial.
  - 99. Q. That is one of allorial to two of cotton?-Yes.
- 169. Q. What interest does a colvent occupier pay to a lania if he lerrows money to make a well?—Not less than 9 per cent.
- 101. Q. We have been feld 0 per cent. I-No. 1 do not think that can be so. I shall not get it myself for less than 2 per cent.
- 102. Q I suppose the resson why people don't make more well she that in ordinary years unirrigated crops can be soon which you well?—Yes, they don't think it worth while to make wills.
- 103, Q. Your object in remitting interest is to make it worth while?-Yee, so that they may be useful in grans
- 104. Q. You would like Government to show more literality.—Yes eliberality should be shown in times of lamine.
- 103. Q. How many famines have there been in Broach in the last 100 3, and ?- Forlups one or two.
- 103, Q. How oft n would the people irritate in ten vor if Perlaps one year in ten. I most the people who have the lens its of ore gation irritate always.
- 107. Q. The ordinary potent, how often would be irrigate is Once in ten years; the well would rarely be used except in the 12 villages where they are necestaned to irrigation; and it would not be kept in repair.

- totrigation; and it would not be kept in repair.

  105. Q. Mont these draine; they complain of the receiving of the service sell in Free, and fields have been determed by service. I can it myself.

  110. Q. Have they done much a rices Larm f.—They let, denotoned here, but mechanice good than harm.

  110. Q. Me. References Midden)—He meets of embandonts of all you mit present the entiring up of the last limited to the entire to eath and that always errors outling; and greenly results in severing to the serface soil.
- 111. Q. By patring a small collaptement, the discage can be marked at first culture promoted for Year, that is le re dere
- 119. Q You say "think notion will se me favored before in extins?"—I at he capeap decreased by In the faults your me saw la. Is impated for the first time in the capeap at the first time in the capeap at the first time in the capeap at the first time in the capeap at the first time in the first time र्त कर हो प्रकृत हो। अवस्त हो यह है कि है लेका सक्र कर है विष्क के कि पर केना तनार रहें हैं कि अनेहि बनवें अहितहा है बहत हुए।
- 113 Q. (Mr. MarcMarkersie) milierali net reguieu groet de die tre metel ImVes
- 114 Q (M. Halandra Mile)-Have any similaling
- Alf de Hendonel volterlingelle inke to dance et they ellert so be alterrie for a liedelle the tajout et exception accepts between to tendings ellert a con-

- applications are disputed of within Eltern or twenty days, Mr. 11. pr. 1 esen in one month sometimes. 11 150 61
  - 116. Q. You lave few applications ?- Yes.
- 117. Q. In pregraph 4 of your see all not a reason and the bound of a case in which a well for which such assument was leviel ment out of repairs and vel the one boucement was not remitted; does not the Tabelld's report and get the necessment relaced for I have not come it yet.
- It and report.
- 110. Q. The fact that the rayat has not applied for it does not present the Tabuillar from reporting on it and getting the assessment reduced F. Sometimes we look upon it in another may; we say it is his business to keep them in repair.
- 120. Q. (Mr. Nair-Nocleanie)-The number of Government wells is very small for the
- 121 Q. What is the assessment on land under Government wite the numb per Ker?—Yes; rupers 8 when it is not permanent; when it is permanent the average is from each name to lie. B per acre.
- 122. Q. De you mean to say that if them are Government wells and a man does not get water he does not complain?—Really the people look upon all wells as their own property. Even wells in Government lands are supposed by the people to belong to them. The rayat will not allow us to repur the wells. They say, "the well is onro," I know of several such cases occurring in the famine year. I went to repair them and the people said "no." Our records show that they are Government wells while they say that the wells are theirs.
- 123. Q. They do not require grants from Government?
  -They have had grants in some cases
- 121. Q. In term " registion revenue " you don't include the extra amount of assessment that is levied on land which is under small tanks?—No, that is always excluded from the figures for " irrigation."
- 125. Q On what grounds do you believe that the enhanced accessment (on a count of prigation) is going to be discussioned at the time of the Revision Survey?—I understand that a general subscoil rate is going to be sulstituted.
- 120. Q You ray that the people are charged kirryat rates even when there is no water in the tanks Yes.
  - 127. Q. Have they made to complaint !- No.
- 128. Q. What is the resson of that f-The charge is sa small that they hardly were; it is a very nominal charge of Iwo to six unnes per nere.
- 120. Q. That is for sub-soil water !- No: it is a tank rate; the best small tank in Jamburar irripater 8 a res ?! sunfare; the total assessment was Rs. 71-12-0, out of which Ra 4 3-1 represented the water charge.
- Mr. Muir-Maclenzie.-The newsment on tank irrigation is very triking.
- 190. Q. (Mr. Rojaratna Mille.)-What is the total assessment on that land?-Rs. 5.
- 131. Q That is land accoment F-Yea; it includes the O.S. on account of the tank water.
- 132. Q. If the tanks were entirely dry, the dry assessment would also be remitted?—Suspension of revenue vould be granted.
- 133. Q (Me. Muis-Muclerate) Von any an ordinary velicous lie seri in black outen soil? -1 have taken the experience a known soil well.
- 184. Q. I want to know the c st of a well in black soil? At would be rearly 110, 700,
- 125 Q. Less in their seel than in braun sell b- Yes; tennes the depth would be less
- lid Q. The depth is less in block cotton sold f-Yes, at the feet we are such get copious mater.
  - 157. Q. You are not onto whether it is awest !- No.
- I'm Q Sometir search good and get a copious sopply of learnest water imalies.
- I.A. Q. Was any attempts also within your local-type tale will forther art to beyond epolic policing wase, water after meeting trackles by the first despirit of -Ver, but it is harrent when some a total it is harrent when he can be a time to the contract of the contract with the first section of the contract with the first section of the contract with the contract when the contract with the contract when the contract with the contract with the contract when the contract with fatheriers 1
- \$40. Q. Have je . seen grang of these dealers Affice ti ::

- 142. Q. Not so much to the higher P.—No; some higher villages complain that there is a defect in the channel, which does not carry owey the water quickly enough.
- 143. Q. There is no question about the upper villages liking the channels?—No; although some injury may be caused to individual fields, there is no doubt that the people have seen many of these channels now and believe that they are effectual in clearing water-logged lands. Some of them out branches to them.
- 144. Q. (The President.)—Is there salt in the water-logged villages ?—No.
- 145. Q. Have you ever seen the soil washed away by droios ?-No.
- 146. Q. Are the water coarses in which these drains fall safficiently deep or do they require to be deepened ?—They are sufficiently deep.
- 117. Q. Would you advocate an increase in the number of tanks?-No; io the number of wells; bat small tanks may be made.
- 118. Q You would not build new tanks P—No, not except those I recommended in the ravines of the Mahi. There a new tank may be made with the object of electing additional agricultural land.
  - 149. Q. Irrigating Bhatba land ?-Yes.
- 150. Q. In black soil you don't advocate may new tanks?
- 151. Q. You admit that rice is a safer erop than cotton F-Yes; with small inigating tanks.

- 152. Q. Why would you not advocate the extension of tanks in the black soil country?—The people knew about these, things and they have already made all the tanks possible.
- 153. Q. They have taken up all the available sites? Yes.
- 154. Q. You say, "where the chances of getting sweet water are surer than in other villages and where the population is thick." Do you think that the large population is entirely the effect of irrigation being there?—No, the irrigation is due to the population and to the superior soil.
- 155. Q. What soil is that P-It is brown soil-gorat-and good sandy soil.
  - 156. Q. It adjoins Kaira ?-Yes.
- 157. Q. Could the people not be induced to repair their own tanks !-It is difficult; it depends upon the Patel and Revenue officers and Agewons.
- 158. Q. (Mr. Muir-Mackenzie.)—Do you think the Revenue officers take a personal interest in the matter?

   Yes, as regards the village and water-supply tanks; but it is difficult for the Revenue officers to attend to all these irrigation tanks. There is not one irrigation tank to each willage, but account in each willage. village, but ceveral in each village.
- 159. Q. If they could at tend to it, it could be done?-
- 160. Q. Have you never managed to do it in the ease of a single tank P-I have managed it in one village.
- 161. Q. If you had time you might have got it deae in another village?—Yes.

WITNES No. 89 .- MR. STED SHAMSCODIN KADEL, District Deputy Collector, Sumt. I .- Answers to printed questions.

#### A .- General.

Mr. Kadri. 1. Tno District. 1. The answers refer to the Olpad Division in the Surat

11 Dec. 01.

I am District Depaty Collector in clarge, Olpad Division (consisting of Olpad, liardoli and Mundri talaka-).

2. The average rainfall in the divisian during the years preceding the famlue of 1899 is as under :-

Rant.	
Middle of Angust to middle of October.	Middle of October to end of December.
Inches.	Inches.
11	1:57
	Middle of August to middle of Getober.

3. (1) In Mandyi and Valese, there is a great obstacle to the extension of irrigation arising from the spareity of Kaliparaj population.

Not so in Bardoli and Olgad.

- (2) The Koliparaj have not got strong hullocks for irrigation. Some Ujliparaj have got sufficient eattle suited to the enlitivation of irrigated land.
- (3) The eastern villages of the Olpad talaka have not got sufficient supply of manuro.
- (4) In some parts black cotton coil is unsuitable for irrigation, but not co everywhere.
- (5) Uncertainty of the supply of water is an obstacle.
- (6) Lack of capital for the initial expenditure and of funds for the more expensive caltivation of irrigated crops is no doubt a drawbeck. The leather has and leather rupe for drawing water cost at the outset about Rs 20 and hardly last more than a year. The maintenance of strong bullicks and servants increases the cost of irrigation.
- (7) There is no fear of enhanced teat or revenue metssment as the revision survey rates are guaranteed for 30 3 enrs.
  - (8) There is no uncertainty of tenure.
  - (9) No other reasons.

4. The land irrigated from works constructed by private capital is exempted from enhancement of assessment on account of irrigation until the introduction of the revision curvey. The exemption is secured to practice as nothing

The exemption from enhancement of rent is extended to tenants if the lease be a long one, but generally tenants do nut care to spend much money in improving the land which does not belong to them. No alteration of the existing provisions of law is necessary.

- 5. Leans under the Land Improvement Act are taken by those Ujliparni Khntedars for the extension of irrigation by me ins of pakka wells who have got land suitable for irri-
- (1) The rate of 5 per cent, interest is not high compared with the exorbitant rate of companid interest charged by the money-leader, but a reduction to 3 per cent., if possible, would certually be a great encouragement.
  - (2) Remission of interest is not necessary.
- (3) I am not in favour of the partial remission of the advance.
- (4) Partial remission may be granted in case of failure of the attempt to obtain water, but such cases would be rare. No well is built pakka until the cultivator is sure of a sufficient supply of such t water. He incurs only tha loss of digging a karloha well at first, and the omeant may fairly be remitted in case of a failure.
- (6) The period of repayments is sufficiently liberal under se rules. This is no grievance.
- 6. As the area to be irrigated is generally small and is undertaken only by agriculturists of mems, the extension of irrigation does not injure the other cultivation. In some parts of the Bardeli taluks, people would be glad to have the means of irrigation increased.

#### B .- Canals of continuous flow.

### C .- Canala of intermittent flore.

There are no such canals in this district, and I have no experieurs of such canals.

#### D .- Tanks.

23. (1) The tracks in the Olpad Division are supplied with min water from the outskirts of the village and the area commanding the tank.

- (2) The water is distribated upon the land by means of an ordinary hand-made lift and small drain pessing through the field.
- (3) The sapply depends upon the capacity of the tank and the area to be irrigated. If the tank be full of water, the supply lasts till December, but if the area of the rice land be large, it rans short earlier.
  - (a) In a year of numble rainfall the supply would last till April.
  - (b) In a year of county rainfall the emply would last till September or thereabout.
  - (c) In a year of drought, the supply is insignificant.
- 24. (a) In the year of ample minfell irrigation increases the produce of the land three times by rendering it possible to cultivate two harvests and by increasing the yield.
- (b) In a year of scanty rainfall the yield would be nearly double.
- (c) In a year of drought the yield would be one time.
- 25. (1) By commencing the irrigation too late the crope either wither or do not grow vigorously.
  - (2) By too early cessation of the supply the Jield is poor.
- 26. When the water in the tank runs short, if the agriculturist has a well available, he irrigates the land by means of the woll to save the dying crops. These cases are rare.
- 27. (1) An approximate estimate of the increase in the total annual value of the produce per acro on an average of normal years would be Re. 50.
- (2) In a year of drought the yield would be about balf of the normal year's.
- 28. Omitted
- 29. It costs about Rs. 5 per acre to bring the water to the field and prepare the land for irrigation.

One that cultivates the land, whoever he may be, has to incur the expense. The tenant has no security for recoupment. It is not the quactice.

- 30. The Public Works Department looks after the irrigation tanks. The system of clearing allt and repairing the tanks does not work well, and it is highly desirable to have systematic arrangements made for repairing and excavating irrigation tanks at least in the course of tea years.
  - 31. There are no tanks constructed by private persons.
- 32. If the laud be supplied to people free of charge and exempted from assessment, soveral persone who have got land suitable for irrigation, would combine together and construct at an k by means of a takavi lose given on their joint scenarity.
- 33, inconvenience is experienced by the holders of rice tand in particular when the tank is silted up. This difficulty is keenly felt in the rice tracts of the Olpad taluka, where, for several years, people fuil to get rice for want of holp from the irrigation tanks. If these tanks were properly executated, they would have supplied some water at least even in a year of scanty rainfall, and there would have been some outturn of rice.

#### . E .- Wells.

Mr. Kadri.

34. (1) The average depth of wells in the Mandvi talaka is about 50 feet, it is about 35 feet in Bardeli and 11 Dec. 01.

- (2) The enpply is generally from springs and from percolation only in rare cases. The sapply from springs runs short in a year of drought and that from percolation fails. The water becomes brackish and comotimes too saline if un effort is made to deepen wells in the Olpad taluka.
- (8) The average cost of constructing a pakka well is about Rs. 400.
- (4) The average duration of n well is 40 years if kept in repairs. There are some large old wells of about 100 years standing.
- (5) Water is usually raised from n well by meane of "kos and varet" (leather bag and rope).
- (6) The average area attached to and commenced by n well depends upon the diameter of a well. A well of a maximum diameter is capable of 4 kes being drawn in the foar directions. From 6 acres to 25 acres can be commanded by a well.
- 35 and 36. The answere to these queetions are the same as in the case of quastions Nos 21 and 27, with this difference that the expenses of supplying water from a well are beavier than in the case of a tank.
- 37. (1) The enhanced rate paid per nore by the cultivator to the owner of land with irrigation facilities is nearly three times the assessment of the land.
- (2) The water-rate charged by Government is included in the assessment of the land. It is nearly as much as the rate for soil and ranges between Rs. 4 and Rs. 6 in the Olpad and Bardeli talukas and is paid on the total area,
- 38. (1) Serious difficulties are encountered in the Olpad taluka in the selection of a spot in which a supply of aweet water will be obtained because there is the danger of the water turning out salme.
- (2) In the Mandvi taluka and Valore Mahal, serious difficulties are encountered in the construction of welle, because the subsoil is story and stones have to be blusted. In some parts of the Olpad taluka the soil is "Chopda," and the well does not stand.

It would be an encouragement to the people if they are helped with expert advice and boring machines.

- 39. I am not in favour of constructing Government wells in private land, because the people would not like to pay the water-rate when they don't irrigate the land, and the income would not be worth the expense. At present if agriculturists use the water of a Government well by means of one "kos," they have to pay its, 12 for sweet water in the Olpad and Bardoli talukas and Its. 6 for brackieh water. In Moudvi the rates are Rs. 8 and 4 respectively.
- 40. Temperary wells are used by the Kells of the western coast villeges of the Olpad taluka to grow vegetables.

They afford some protection against drought. In a year of scanty reinfall takavi is freely giron for the construction of kachcha wells, and 162 such wells were constructed by the people with fukavi during the drought of 1800.

### Memorandum by Witness.

II

I am in charge of Olpad, Bardoli, and Mundvi talukas.
Olpad taluka is capable of being divided into three parts-

- 1. The Western Coast villages, the soil of which is mostly loose sandy which requires min in Septembor and till November for mixed erop. Sweet water can be found within a depth of from 10 to 15 feet, and the water-cupply is percolution. If a well be suak deep, the water is brackish. One-third of this taluka is impregnated with ealt.
- The central villages have brackish water underneath. Some of these villages have sweet water wells for drinking purposes.
- The water-logged villages are in the east. They fare well in point of crops when the rain is scanty and daring the famine of 1899 they were well off.

In the Olpad talaku, on the list of the Irrigation Department there are only 40 tunks which irrigate upwards of 20 acres, but in the whole taluka there are about 503 tanks,

١,

ewall and large, which irrigate less than 20 acres each. There are 127 pakka wells for irrigation and 986 wells for other purposes. It is possible to make new tanke in the west which is subject to tidel waters. In 1899, the people of Bhagya, fishermen, raised about Rs. 1,500 privately and unde n new tank. It would be advantageous to make everal such tanks on the coast. They would keep off tidal waters, reclaim sait land and loud to an increase in the ries land. Famine lubour own well be employed on such tanks. In this taluka there are 71,507 acres of unculturable land.

In the water-logged area, now tanks can be made and new rice land increased. Between Kudsad, Kareli, and Shiyan, thie experiment can be tried. For the Olpad taluka, I recommend firstly, the improvement of a large number of tanks already in existence, and secondly, romuke new tanks on the coast and in the water-logged area.

#### The Bardoli Taluka.

This taluka has already 698 wells for irrigation and 1,443 for other purposes. With the exception of the

11 Dec. Q1.

Valoro Mahal, this talnka did not suffer from famiae. Valoro Mahal, this talaka did not antier from famiae. There is a tendency to increase irrigated erops. In 1891 the irrigated erops were in 843 acres, while in 1910 the area rose to 1,286 acres. This taluka has 42 tanks for irrigation and 55 far ether purposes. This taluka is espahlo af irrigation; but the country is flat and a canal is ant possible. If people be helped gratis with expert advice and boring appaintus, there would be an increase in the area under irrigated crops. This taluka has about 20 per cent. of rice cultivation. ceat. of rice cultivation

#### The Mandvi Taluka.

This is mostly a billy tract and the bulk of the population is Kalipraj (aboriginal tribes.) This talnka suffered from famine in 1899, and the Kalipraj did not avail themselves fully of the relief work far from their population. This taluka has oaly nine tasks for irrigation and 23 for other purposes. It has only 24 wells for irrigation and 383 for other parposes. The rice land is utilized by the Kalipraj and the rice beds are more like small poads, from 3 to 6 feet in depth and unlike the ordinary rice heds elsowhere. It is possible ta find new sites for small and large tanks in the taluka. Nallahs can be bunded. This will afford enitable relief to the Kalipraj and increase the number of tanks and thereby lead to some increase in the rice land. Welfs have to be sank very deep and the stony soil below has to be blasted. Kalipraj can also be couployed in removing stones and weeds from their fells as ployed in removing stones and weeds from their fields as famine labourers and in making rice beds and bandharas on their land.

- 1. Q. (The President.)—You are District Deputy Collector of burst?—Yes.
- 2. Q. How long have you held that office ?- About 41
- 3. Q. Do yon know this district ?-I am familiar with the talnkas of Ulpad, Bardoli, and Mandvi.
  - 4. Q. How many talukas are there !- Eight.
- 5. Q. You saw the effects of famine?—Yes; in Maudvi the only talaka that suffered from famine.
- 6. Q. There had not been famino before for a very long time f-No, I believe not.
- 7. Q. What do you think is the best thing to do to make this district strong to resist a future famine?—The olr-cumstances of the different, talukas are different, for incumstances or the different tataks are difficult. As in-stance, Olpad has three parts; one, the western or Sea Coaet part, is very andy; the middle is practically impregnated with salt; and the eastern part is water-logged. In the eastern part I would increase the number of tanks and improve existing tanks.
- 8. Q. Are there a good many villages without tanks?— Yes, in the Olpad taluka I find there are small and large tanks, in all 503; the Irrigation Department has taken notice af oaly 40; there are 31 villages which have got above four tenks each; in some villages there are 22 large and small tanks, those is another village called Maadroi which has 18 tanks.
- 9. Q. The area irrigated is very small?— Most of them irrigate 10 acres and upwards, the Irrigation Department has taken aharge of tanks which irrigate more than 20 acres; tanks irrigating below that are not taken care ef.
- 10. Q. What would you do for the western part?—I would propose the improvement of the existing tanks; there is also a possibility of finding sites for new tanks. A few fishermen in the coast villages constructed a tank for which we simply gave them a small contribution. It cost in all about 18s. 2,000
- 11. Q. How many acres can be irrigated under such a tank?—That depends upon the capacity of the tank; at least double the area of the tank could be irrigated.
- 12. Q. What shout ether parte?—In the central part we find the water brackish; and the deeper you go the more selty it becomes. They have wells near the tasks which have drinkable water, but for irrigation purposes I think it is not suitable. Then in the eastern part there are waterlogged areas which faied best during the famine; during the year 1899 I found that the water-logged villages were the water represents in my talking. the most prosperous in my taluka.
- 13. Q Have you inspected any of the drains?-Yes, I saw one last year; it has been lately constructed; it does not run through mar soil-

Daring the last two years, about two lakes of rapecs have been epent in takari. Of this amount about half wao glven for the improvement of land. About Rs. 50,000 were given for pakka and lachcha wells. More than Rs. 10,000 might have been spent in making rice beds and landharas. With takari 133 pakka wells and 163 kachcha wells in the three tslukas under my charge. The Kalipraj have ordinarily to pay from 12 to 24 per cent. interest to the money-londer. The Ujlipraj pay from 6 to 12 per cent. Smell tanks in a large number of villages are to be preferred to a few large tanks.

Thu Amha Pardi Tank is likely to submerge about 756 acres, some of which is good land under cultivation. It is expected to inigate about 1,500 acres, but this is doubtful while the loss of culturable land under submersion is certain. while the less of culturable lend under sabmersica is certain. The Kalipraj are not very foad of irrigation, and they have their own pends where rice can be grown. The country is irregular with ridges and hillooks hardly fit for esnal irrigation. The people are poor and may not be able to pay extra water-rute. If the Teluka Beards get the irrigatian revenue of small taoks abandoned by the Fublic Works Department, and if they are helped by some further grant, they can more economically and advantageously improve these small tunks. There are 35 villages in the Olpad taluka which contain more than four tanks. Dihea alone contains so many as 22 amail tanks. The small tanks in the taluka which are good many badly require repairs. Their improvement would lead to an increase in the rice land. The terms for fakcei are liberal enough and those that require it take it without any enough and these that require it take it without any difficulty.

- 14. Q. Is it expected to do useful work?—Yos, so far as that village is concerned; but it was badly aligned and some of the lands have been scoured away.
- 15, Q. Is a good deal of rice grown on these lands?—No. These lands are capeble of producing rice, but in order to make rice beds we have to store up water; we have found places where we can store up water, and when we get a storage tank, a lot of the surrounding land can be converted
- 16. Q. Do you advocate an increase in the number of tanks?—Yo., small tanks; if we improved these small tanks which me at present mostly silted up, the people would be ready to increase the area of rice lands. They do not do so now because there are no possibilities of irrigation.
- 17. Q. Don't they prefer cotton to rice?—I don't think so. Rice is always a paying crop because you can grow two crops followed by wheat; hesides cotton is subject to certain diseases.
- 18. Q. What are the general fratures of the Bardol taluka?—The largest area is under rice. In 1891 they irrigated 843 acres, while in 1900 they irrigated 1,286 acres, that shows that people are fond of irrigation and that they would extead it if they land the means.
- 19. Q. This taluka possesses a gaod many wells?—Yos, 698 for irrigation and 1,400 for other purposes.
- 20. Q. As regards Mandvi its hilly tracts are mostly populated by aboriginal tribes?—Xes, they are not very fend of irrigation; the population is very sparse; on the hills irrigation is not practicable.
- hills irrigation is not practicable.

  21. Q. Would it not be practicable to find a site for a reservoir?—Yes; they have found one place at Amba Pardi, I saw it personally, I do not think there is any great chance of that achemo being successful; the greatest objection is that while it would irrigate perhaps 1,700 acres it would certainly submergo 756 acres of the best mable land; it is mostly khari, and the prospects of agriculture are doubtful. For the same cost I could get 200 tanks excavated which, taking an average of 16 acres, would cavily promote rice lands to the extent of 3,000 acres that would help three talking a finite. talukse of mine.
- 22. Q. Generally speaking you recommend tasks?—Vory strongly; small tasks; I would also recommend an increase in the number of wells.
- 23. Q. Is there a large increase going on just now?—No; during the famine year and last year I had about 296 wells added to my charge.
- 24. Q Mr. Ibbetson.)—Were they built pakka?—There were 133 pakka and 163 kacheha.
- 25. Q (The President.)—We have been told that the people do not like to borrow money?—That is a mistake I

noticed during the lost two furnises that they took takavi very rapidly for the improvement of their lands. They have made new rice lands and recently they have also grown grain.

26. Q. You think they availed themselves of takari freely?—Yes.

- 27. Q Dn you think any encouragement is necessary so that they may be induced to make still further improvements?—We have already had the orders of Government to show them leniency in the metter of the remission of ments P-
- 28. Q. De you think it would be a good thing for Government to lend money without interest for a certain time?

  —I do not think it would be a good thing, because when they go to the sewear, the sowear charges them from 12 to 24 per cent interest. I think the interest charged by Government is small enough. In certain cases if Government would grant remission the people would appreciate it.
- 29. Q. (Mr. Muir-Mackenzic.)-Remission during fa-ine f-Yes. mine ?-
- 30. Q. The President.)-You found that the people required no encouragement here?—I don't think so, they appreciate the grant and take advantage of it wherever it is possible. For the information of Mr. Muir-Mackenzie I may be permitted to say that between Kareli and Kudaad there is a tank where a reservoir and a small drain for water-logged areas could be built.
- 31. Q. In cortain places you think it is advantageous to have an extension of tanks?—Yes.
- 32. Q. The increase in the number of welle is going on without Government taking any netion in the matter?— Yes.
- 33. Q. You don't see ony necessity for pressing the people to make new wells?—I think they want special inducement, but I would let them have boring tools and the services of an expert; they are afraid of certain sites, because they are doubtful us to whother sweet water will be found.
- 31. Q. Supposing a man finds good water, would you make him pay naything f-No, I would give assistance free. I think it is better to increase the number of wells by giving them help
- 35. Q. You recommend that more money should be speat than bee been spent lutherto upon the systematic improvement of tanks ?—Yes, I am sorry to say that very little is speat for irrigation proposes. I would propose that in the Mandvi tulukn, where famine was bad and where we have gut a very small number of tanks, Government should let off interest; places can be found where new tanks can be made, and this would leed to an increase of rice lunds. Mandri has got only nice irrigation tonks and 28 other tanks; but there are facilities for increasing their number.
- 36. Q. You say the place should be surveyed and examined P-Yes. I have already found 12 places which, if approved of by the Public Works Department, are likely to be taken up.
- 37. Q. You think that the best work for famine labour is the improvement of these drolunge chemnels P—Yes.
- 38. Q. You would make these tanks beforehand as protective measure; you would not wait for famine to arrive?

  —The scener we could do them the better.
- 39. Q. What sort of work would you put fomine labour on ?-If I had to open famine work in the Mandri tulnka, looking to the choraeteristics of the people, I would cortainly propose village works, because during the last famino there was n central large work opened for thom where the bulk of them would not go stendily and many people suffered. I should prefer to have small village works.
  - 40. Q. In each village?-No, in a group of five villages.
- 41. Q. The repeiring of these tauks could go on?—Apart from the Alaudvi taluke if we construct tanks, they would lead to an increase in the unmber of kari (rice) lauds. Thet would be a very great improvement. Apart from that, I think, we can very well employ the people in classing any lauds. clearing up lands, stones and weeds.
- 42. Q. (Mr. Ibbetson.)—You told us of one village where the people made a tank, cesting Rs. 2,000 with a small grant from Government?—It was a contribution of the fishermon of a village who serve on steamors. They are not agriculturists, but they raised a popular contribu-tion in the village of Rs. 1,500. They are sailors and most of them own land.

- 43. Q. If thet can be done in one village, why should it Mr. Kadri. not be done generally ?—It can be done. If the Irrigation Department chooses to undertake the work, the people would one forward to pay one-tenth share. Recontly in the Olpad taluat two villages did this by contributing Rs. 400.
- 44. Q. These people paid more than one-tenth?—Yes, because this was entirely a new tank, and thry were auxious to do it.
- 45. Q. Why not have more tanks made?—We can, that is my scheme, we have got waste lands, and we have succeeded in making tanks. I think we shall be able to sweeten the soil and increase the area of rics lands.
- 46. Q. Could you get this done in the coast villoges?—Yes; that is the most appropriate place.
- 47. Q. (Mr. Muir-Mackenzie.)—It cannat be done in Mandvi ?—It is ruther hilly, there is want of sites for Mendvi P—It is rather hilly, there is wast of sites for storage, during my 15 days tour I have been able to find 12 mee sites, which I believe the I'ublic Works Department will approve of, they are in a good entehment area.
- 48. Q. (Mr. Ibbetson.)—Could you get the people to make the tanks l—Na, they are the quest.
- 49. Q. Why are you in favour of small tonks? Why do you not advocate big ones?—Because their number would be small and they would not belp many of the people.
- 50. Q. There is also the question of distribution f-Yes.
- 51. Q. Have you any other objection to big tanks ?- I do not know of any other.
- 52. Q. You would rather here ten tanks irrigating 1,000 nores than one tank irrigating 1,000 acres ?—Yes.
- 53. Q. You get a sure supply from the big tanks? In the case of ample rainfall the supply, ia my opinion, would be more in ten tanks than in one single tank.
- 54. Q. You say that the bania charges 12 to 24 per cent. interest to a cultivator who borrows money for building a well ?- I was talking of Kaliparej (kill tribes.) The money is borrowed not only for building a well but for other ordinary purposes.
  - 56. Q. That is in Mondvi ?- Yes.
- 56. Q Outside Mandvi in the other talukus, what is the rate ?-About 12 per cent. would be the rate.
  - 57. Q. To a solvent cultivator ?-It may be less.
- 58. Q. Could be borrow at 6 per cent. P—For him to obtain that rate he must be very solvent and must mortgage his ernaments. When a banio lends Rs. 300 or Rs. 400, he gets some security and charges less interest.
- 59. Q. (Mr. Rajaratna Mdlr)—There are about 450 tonke which trigate less then 50 neres according to your account?—Yes. In Olpad alone.
- 80. Q. Do you mean t of the total assessment ?we gave this concession so that the people would repair the tanks. I think if these tanks were handed over to the Local Beards with a share of the irrigation revenue and some further grant from the Provincial Funds, and that if the people also give some contributions, there was e chance of improving these tenks.
- 61. Q. Could not the Revoaus Department manage to undertake these repairs with a small establishment?—Instead of ereating a separate ugency I would rather strengthen the agency of the Talukn Beard who would be better able to manage it more economically, the Revoaus Officers would take an interest in the matter and supervise the work of the Taluka Boards.
- 62. Q. Whot facilities bute the District Board for supervising ?-They have get their own staff, District efficere,
- 63. Q. They would be in charge of the Revenue officers ?-Yes in their ex-officio espacity.
- 64. Q. What is the general mode of assessment f-It varies in different talukas.
- 65. Q. (Mr. Muir-Mackenzie.)—What, is the average assessment in Meady: ?—From Re. 2 to Re. 4 per core in Mandyi; in Bardeli I found it varied from Rs. 31 to Re. 41, and in Olpad from Rs. 4} to Rs. 7 per acro.
- 66. Q. (Mr. Rajaratna Mdlr.)—Supposing we considerably reduced the rate, would the rayat be encouraged to construct small private 'tanks'?—Waerever proper may get rice lands, they can't spare them for making tanks.
- 67. Q. Are there not culturable waste lauds?—No, not near rice lends.
- 68. Q. They can convert any land into rice land !- They can, if there are facilities for water.

- Mr. Kadri. 69. Q. (Mr. Muir-Mackenzie) Woold they not be able to cultivate in the bed of the took? Yes, if the tank is 11 Dec. 01. not full of water.
  - 70. Q. In the rabi season they oultivate in the beds of tanks?—Doring the famine they were allowed to do so. I do not think that would lead to a great increase.
  - 71. Q. (The President.)—They are not now allowed ?—No; in fomino years they were allowed.
  - 72. Q (Mr. Rajaratna Mdlr.)—What is the uncul-brable area of the three talukas rooghly ?—I have got it ncourately-

. 71,567 acres. -Olpad . 16,137 "

- 73. Q. Is there a very lorge aree which it is physically difficult to irrigate?—Yes, 71,000 acres ore mostly salt land and subject to the overflow of tidel water. We would have to reclaim that.
- 74. Q. If wasto lands were given on favorable terms would the rayat be encouraged to construct small tooks and to convort the land into kiari land P.—They would.
- 75. Q. (Mr. Muir-Mackenzie.)- On what favourable terms?-Rs. 12 kiari ossessment.
- 76 Q. (The President)—If we reclaim waste land?—They would convert them into rice lands.
- 77. Q (Mr. Rajaratna Mdlr.) Does the fear enhonced assessment prevent the rayat from extending the number of wells ?—No; because they know for certain that there is no possibility of the rate being increased which is fixed by the Survey Department.
- 78. Q Would you employ famino labour to dig kachcha wells ?-Yes.
- 70. Q. Would that not only give employment to famino labour but also benefit the people?— Not to a great extent; it would give rehef to some famino labour, because we cannot give employment to many thousands of people unless we nadertake to construct hundreds and thousands
- 80. Q What is the difficulty in digging hundreds of thousands of wolls?—The difficulty is of supervision.
- 81. Q. It is under the supervision of the Public Works Department !- Yes.
- 82. Q. Instead of giving money in the shape of takavi, would you not grant famine labour ?—The rayat will take to famine labour most readily if you do not wish to recover.
- 83. Q. We do not mean to recover?-If you charge the as Q. We do not mean to recover?—It you can't entray to famino labour employed, then they would not uscept it. First because the famine people are weak and they do not de that quantity of work which a strong, ordinary labourer would de. If you give inducements to a lot of people to take advantage of kachcha wells, you may expect to see hundreds of wells being constructed.
- 84. Q. (Mr. Muir-Mackenzie.)—There is a great distinction between the three talukas in your charge, three differ from one another?—Yes, considerably.
- 85. Q. In the Olpod taluka do you consider there are large arese which may be reclaimed from tidal water?—Yes.
- 86. Q. They would be useful to employ famine labour on ?--Yes.
- 87. Q. You think famino labour may be employed on reclamation works?—Yes, in the shape of tanks.
- 88. Q. And reclamation from tidel water ?-Yes, at present I would like to see if the surrounding embankment would be made to serve the double purpove—the reclamation of the land oud the storage of water; if we have a nice reservoir of water, u good deal of kiari land could be
- 89. Q. You soy in regord to giving omployment to famine lobour; "that is always my iden; have you made any

- proposals ?- Yes; that the tanks should be taken in band on the coast villages.
  - 90. Q. New ones?-The existing ones.
- 91. Q. You say, "they should be employed on making bunds and reolsiming lands from the action of tidal water?"—Yes.
- 92. Q. Take Mandri ?-I understand the country is hilly. Yes, and full of ridges.
- 93. Q. You recommend the bunding of the water courses?
- 94. Q. And clearing oway sand?-Yes.
- 95. Q. Would you advocate the terracing of land in Mandvi?—I do not think so.
  - 86. Q. There is no scope ?-No.
- 97. Q. Yoo granted a good deal of takent for making new rico londs?—In all I have given 2 lekbs of rupces, helf of which goes to the improvement of land.
- 99. Q. How much of that half has gone in making new rice lands?—I have not got accurate figures, but I can gire you the figures.
- 99. Q. Could you give me an ideo, 10,000 ?-I should say something more than that.
- 100. Q. Over Rs. 10,000 have been spent on the improvement of land and making new kiaris?—Bandharas and mostly kiari.
- 101. Q. In Olpad what was the form of famine labour ?-Olpad did not suffer last time; this year they are not likely to suffer.
- 102. Q. In Olpad there is a considerable water-logged orca?—Yes; in the east of the faluka.
- 103. Q. Are now tanks being made there?-There are old tanks, but there is room for new ones,
- 104. Q. The old tanks ore being improved?—Yes, this year by the Public Works Department.
- 105. Q. Do the people pay the enstenth contribution?-
- 100. Q. It is a simple exception of the ordinary rule that if people give 10 per cent. contribution, their tanks should be repaired P-Yes.
- 10%. Q. Could new tanks be made in those villages?-Yes; it would be possible.
  - 108. Q. Have people applied ?-They have not.
- 109. Q. Not the people in your charge ?-No. If tanks are made, the people would make rice lands.
- 110. Q. Mr. Woles told us yesterday that the number of acres raised by tanks is about 23,000 and that the outside area of rice in the district is about 60,000?
- 111. Q. Do you think that new tanks could be made with advantage, so os to protect soon part of the 80,000 neres which at present have no tanks?—I should think so.
- 112. Q. De you think improvement of the existing tanks is the first thing ?--Yes.
- 113. Q. Would you like them to come first ?—Yes; after that I should certainly look to more tonks.
- 114. Q. Do you think there are sites and places where they could be made?—Yes.
- 115. Q. Do you think the people would not give up their lands?—Not in Olpad or Mandri.
- 116. Q. Why not in Olpod?—In the water-logged areas there are lands now looked upon as waste which can be converted into rico londs,
- 117. Q. Water-legged oreas moy be converted?—Yes; if we can store up water we can exente rice beds also.

Witness No. 39.—Mr. A. C. LOGAR, I.G.S., Collector of Broach.

Answers to printed questions.

Mr. Loyun. Poragraph 2-Protected by Government Acres. 1,038\* \*Only nominal tanke protection, as these tanks do not 'octually Protected by private tanks Acres. 1,279 3; 11 Dec. 01. Protected by private wells 720 . 998,791 Gross area . 8,037 irrigate' any land, except in Culturable area 692,630 the monsoon.

1	Pn	OTECTE	BY .	1			
Talukas.	Govern- ment works.			Renares.			
	Acres.	Acres.	Acres.	,			
Broach			149	These are the areas			
Amod			81	in normal vone			
Jambusar .			150	In famino years			
Wagra	21	100	70	dug as well.			
Ankleshvar .	881	67	302				
Hansot .	680	1,112	18	•			
Totals .	1,088	1,279	720	•			
GRAND TOTAL	***		3,087				

Character of the soil.—Three-fourths of the soil is black or cotton soil, three-sixteenths are gorde or wheat soil, and one-sixteenth is bhatha or tobacco soil.

#### By Talukas.

Jambisar.—About equally divided between black or partielly black and light soil. The last soil in the eastern half is well wooded and contains plenty of sweet water.

Wagra.—Eastern half black : western light and largely salt.

Broach.—Almost all tich black, test bhatha, and a little gorat near the Nerbudda.

Ankleshear and Ransot.-Mostly black; but about 14 villages near the old bed of the Neihadda possess gorat.

Amud. -Three-fourths black soil: rest light, and in the west, salt.

Extent to which cultivation depends on irrigation — To a very slight extent. For normal years this has been shown above. In a year of searcity kachcha wells are dug to some extent, and the area irrigated may be grently increased.

Rainfall.

,	Talul	iag,		Average of 10 years be- fore 1866.	Average of last 10 years.
Jambusar. Amed Wagra Breach Ankirshvar Hansot	•	•	•	23·23 24·66 26·70 37·58 } 38·4	81·64 44·71 82·95 41·65 80·54 36 80

Demand for water in monsoon.—Ordinarily there is Mr. Logan. no demand for water in the monsoon. But there is some demand for tank water for rice and kodra.

11 Dec. 01.

### Irrigated crops and their waterings.

Jambusar.—Pepper and brinjals are sown in July and require water every eighth day from Novomber to February.

Tolacco is sown in August, and watered from November till January. Onions are sown in November and December and watered till April.

Total area thus oultivated is 150 acres. The irrigation is from wells. No special irrigation cess is levied on this land.

Amed.—The above crops and also sugarcane are sown in 31 neres of land irrigated from private wells. A kee cess of £8-12 is levied.

Wagra.—Inigntion is practically roughed to about ten villages in the east of the taluka with 35 wells which irrigate about 15 acres. The above crops are grown and watered every fifth day in winter. In two of those villages a kee rate of HB per well is taken, as the wells appear to be the property of Government.

Broach.—The above-mentioned crops are sown in 149 acres of land irrigated from wells. The crops are watered once a week. A kes rate of R 12 is levied.

Ankleshrar.—An arra of about 803 aeres is ordinarily irrigated from private wells in about 14 villages with light soil.

Hansot.—There was no irrigation from wells before the famine. Now about 18 acres are so irrigated. About 1,112 acres of rice laud are ordinarily arrigated from tanks during the monsoon. The distribution of the water is privately arranged by the kbatedars. There is no separate irrigation revenue.

The general rule about water revenue in force in this district is that R12 to R4 according to quality of water, otc., are levid on well water taken to irrigate any land on which a water-rate has not been sasessed if the wells were built before the Survey Settlement, or if they are Government property; but not if they have been built or repaired since the Survey.

Paragraph 7.

Total area irrigated by scelle

		A OU	al arc	a irri	gatea	l by scells.	
•		Tulul	kas.			Ordinary years,	Droughts.
	Jambusar Amod Wagra Broach Ankleshvar Hausot	:	Tor	· · · · · · · · · · · · · · · · · · ·		Aeres. 160 40 70 149 803 18	Acres. 2,000 800 400 149 697 71
					•	730	4.117

New wells constructed annually during last ten years.

***************************************					1		A MATTER	annun	uy auri	ng last	ien yea	rs.			
		<del></del>		·	1891-92	1692-93,	1293-94.	1591-05.	1893-96.	1896.97.	1897-93.	1893.99.	1899-1900.	1900-01.	TOTAE.
Jambusar. Amod	•	•	•	٠	***		3			24	2		116 K 28		116 72
Wagra .	•	•	•	•	•••		***		***		***	{	35 P 200 K	}	235
Breach Ankleshvar	•	•	.•		•••		•••			21	4 K	{	199 P 47 K	}	205
•	•	•	•	•	3	5		8	2	***	11		15	•••	39
Hansot .	;	•	•	.		1	:		2			1{	124 K 9 P	} 6	143

P=Pakka. K=Kacheha. Mr. Logan.

Takavi advanced for wells.

11 Dec. 01.

Jambusar . 38,730 in 1899-00. (Most wells left nafinished )

Amod . . 14,780

Wagra . . 18,225 in 1899-00; 1,000 in 1900-01. . 64,772 in 1899-00. Includes repair Brosch .

of 36 wolls.

- Ankleshvar 2,425 io 1891, 95 aod 99.

6.887 in 1899-00. Hansot .

#### Concessions to constructors.

No special concessions are given to the constructors of new wells.

#### Measures to stimulate construction.

The construction of wells was stimulated by liberal grants of takavi in the famino year; and the practical results up to the present or not encuraging. From Jundusar it is reported that the majority of the 11G wells built from takavi bove been left incomplete, become the water turned out bad or, more generally perhaps, because the unfinished well served a temporary purpose and the builder had never contemplated anything more. The Amed Mamlatdar refers to cases where the water proved brackish or insufficient. In Procedus in Jambusar most of the wells were merely kachcha wells used in the famine year only and now abandoned; but I have also a fine pakka well constructed in the famine, which has not been used since; and probably never will be, because even this year when there was six weeks of drought at an important time, the field round it bears a 16 anna crop without irrigation. In Ilanot most of the Tegai was spent on merely kachcha wells.

In may be said with confidence that it is not desirable

In may be said with confidence that it is not desirable to stimulote the construction of wells in the black soil half to stimuloto the construction of wells in the black soil half of this district for two reasons; first that the cotton crop can probably do with less water then almost any other, and secondly, that the water in block soil wells is sure to be brackish or to turn brackish if the well is made deep enough to get a sullicient capply for irrigation. Nor do I believe that owners of cotton sail would reapond to any stimulus except with the motive of handling Government money on easy terms, and getting a remission of the lean when, as calculated on, the well proved a failore.

In light sail villages, at any rate in those tracts where

In light soil villages, at any rate in those tracts where there is known or believed to be a fairly ample sapply at sweet water (e. g., the north of dambuary) it will be enflicient stimolas to offer takavi liberally, bot on the ordinary terms, to khatodars who apply in good faith.

#### Extent to which wells have been affected by drought of 1899-1901.

Jambusar.—There are practically no irrigation wells to refer to, but some of the drinking wells ran short and others became brackish. The effect of deepening such wells was almost invariably to make them brackish. Only one well ont of 51 deepened improved by boring. Distance of water 50 feet.

Amod.—Some small wells dried up, and the larger lost 80—40 per cent. of their water; and in some cases the water turned brackisb. No wells are said to have been deepened; probably because the california rank well what the result because to make 20 the said by the said to be would be. Depth of water 60 feet.

Wogra.—There were no irrigation wells in Wagra before the famine year. Depth of water 30 feet.

Broach.- In no case was any well deepened, as none ran dry. Depth of water about 50 feet.

Ankleshvar .- Only one well fell into disuse, the wells had to be deepened; but this was probably done with castion, as they are not said to bave gone sait. Depth about 40 feet.

Hansot.-Ko woll required to be deepened in the drought. Average depth 30 feet.

All these statistics refer to drinking wells for the most part as there are few irrigation wells to report on, and what is trace of drinking wells will be approximately true of irrigation wells with the provise that the conditions under which irrigotion wells are made, as regards supply of water

and sweetness, will usually be less favourable then those of drinking wells, which are generally dug in carefully selected ploces on the banks or the beds of tanks.

The cost of wells for irrigation is variously estimated as follows :-

				P
Jambusar				800
Amod .				1,000-1,500
Wagra .			•	7001,200
Brooch .	•		•	300
Ankleshvar			•	600
Hansot .		•		500

It may be taken that a good irrigation well will cost about 4800, and that one kee will irrigate about two acres. I have not been supplied with Mr. Crimp's report on artesian wells.

#### Paragraph 8.

### Water-logged tracts.

Jambusar.—The Mamlatdar mentions a need of small channels for the eastern border of his taluka, another in the centre between Vad and Kāvā and others at Siguras and sandārpar to the soulh. It is admitted that "owing to the light minfall of the last half dozen years" there is not a treet outery for these channels; and that the channel made to drain Jintran about 12 years mgo has ruined the cultivation of rice. The average vainfall of the last six years was 28 inches and the talaka is not likely to get better rain than this at any time; accordingly there would seem to be no need in Jambusar to enter on any of these channels experiments. Jambucar.-The Mamintdar mentions a need of small dangerous experiments.

Amod.—The following tracts are reported water-legged "in very mot years."

Tracts :-

- 1. North of Itola,
- 2 West of Chaldad,
- 3. North of Sadi,
- 4 South of Tancha, 5. North-West of Telod,

and small channels are said to be occded to provent damage to the crops. The question may well be deferred till the to the crops The questi

Wagra —Two channels are said to be required "in very wet years" to drain water from the villages of Aidli and Ochvan-Keshvan; and the above remark applies to them

There are four important drainage channels in this talula constructed from ten to five years ago. They are reported to be ruining the lands they drain by washing away the surface roll; and the people are said to be praying that they be allowed to silt up. A foll report on the subject has been seed to Mr. Beale.

Broach.—Two channels already exist at Vagusna and

There is a tract said to be water-logged in years of excessive minfoll between Sitpan and Nand (north of Janor), and the Public Works Department are believed to have a plan of channel ready as a fumine work.

Ankleshear.—There is already one channel in this taluka. The following 23 villages are said to be still water-logged and to need channels:—

<ol> <li>Anklesbyar.</li> </ol>	12. Adádrá.
2 Pánod.	13. Sarthán.
3. Chaprá.	14. Kánvá
4. Umarrádá.	15. Nagal.
5. Alouj.	16. Sajod.
6 Safipurá.	17. Mándrá Mátiad.
7. Kurmali.	18. Divi.
8 Ravidrá.	19. Hajāt,
9. Pilpdrá.	20. Adol.
10. Pordi Idris.	21. Telmo.
11. Sisodrá.	22. Motwan.

23. Mandwa.

Hanot.—Six villages on the tho eastern border between Mangrol and Godadra are soid to be water-logged for a week after heavy rain.

There are no existing channels in this Mahal.

Drainago chonnels are excavated by the Public Works Department with provincial funds allotted for that purpose. Presumably the Public Works Department will give the statistics relating to the retorn from the existing works, as I have not been celled on to taske coy note on this peragraph of the memorandum; but whatever anticipations are raised from a temporary increase in the quantity of wasteland taken up near a channel at first, may be deshed by relinquishments in subsequent years should the chonnel all produce the resolts experienced in Wogra. At any rate the matter is evidently one requiring the greatest caution and ought to be left to the District Officers. Every proposed channel should be dealt with separately and on its own merits, ead none undertaken without careful inquiry on the spot.

The total number of irrigotion wells in the district is -

					Pokla.	Kachela
Jambusar					341	89
Amod					102	15
Wagro		٠.			40	•••
Broach					839	51
Ankleshvan Hun-ot	}			:	247	G
					1,066	114

II.—Note on the suggestion that rice cultivation should be encouraged in Broach district at the expense of cotton by digging tanks for irrigation.

I would most strongly deprecate any oction by Government to encourage a substitution of rice for cotton in Reach. The notural tendency of the people, who know something of their own interests, is all the other way; if a man has a water-logged field which can grow rice he begs Government to make a drain that he may grow cotton. Possibly in a very wet year there may be a little more to be made out of rice than out of cotton: though not so much as is supposed; for the best cutton fields are said to yield as much as its. So per acre, and no Broach rice field would be likely to yield that. But the instinct which prefers cotton to rice is quite sound. For a district with light rainfall and tanks which will not hald water much longer than it is falling into them, cotton is undoubtedly the best and rice the worst crop to encourage. The following facts

cstablish this, as it seems to me, boyond question. In the r. Logan. M famino year when all crops nearly failed rico failed uttorly in every taluke except Ankloshvar; whereos the cotton 11 Dec. 01. entirely failed in only two talukos, and in Ankleshvar it was as good as the rice. Last year with a rainfall of 31 inches the following was the valoation of the two crops in the various talukes:—

•		Tal	ukes.	NAME OF OROFS.				
		14.	APPS.				Cotton.	Rice.
Jambosar	•	,	•	•	•	•	8	1
Amod							10	1
Wogio	•					•	6	1
Brooch		٠				•	10	3
Ankloshro	r	٠	•		•	٠	10	6

This year results are even more instructive. The highest rainfall was 21 inches in Jambusar; and the average for the district was 20. The rice crop has been a general follars: it may have been as much as 4 anans in Ankleshvar but nothing elsewhere. On the other hand, the coltan estimates (spart from the rats) given to me by my District Agricoltural Iospector are—

Innabnerr		•	•	•	•	•	20 a	nnas
Amod				•			20	,,
Wagm	•		•	٠			12	,,
Broach	•			•			20	,,
Anklesh	var						16	

Thus while in three years of poor rainfall (the fell of 1900 censed too seen, which is the worst fault rain can comult in Bronch) cotton has varied from fallure to abnormal richness, rice has remained at one dead level of feilure. This crop with tanks and all behind it can often not produce a grain where cettra is producing 100 bells to the tree. It is manifestly therefore the most unsuitable crop that coold be suggested for encouragement as a stand-by in time of druught.

Nor it is possible to orgue that rice might be sewn first and cotton subsequently, should the rain or tank water prove insufficient for the former. It would not be possible to foresce the failure of the rice till about the end of August, and it would thou be too lote to sew cottou.

- 3. Q. (The President.)—You are Collector of Broach ? -- Yes.
- 2. Q. What general measures do you consider to be the best to enable Broach to resist famine P—I do not think there is any measure of irrigation which would do any pool, because there is no scope for irrigation. We could not possibly got water.
- 3. Q. There are wells, I suppose ?—Yes, but the water-supply is limited, and they would be of very little use.
- 4. Q. The depth is bayond 30 feet?—Below thirty feet the water is salt; you can get a limited supply af sweet water but directly you increase the supply you spoil the water.
- 5. Q. Is that invariably so?—Almost invariably. Perhaps there may be small tracts where you get sweet water at a considerable depth, but I should say it is true for its of the district.
- 6. Q. Daring the last femine when did the wells give out?—I was not in Breach during the last famine. Practically there is little irrigation from wells in Breach. All the wells give out about the beginning of the dry weather.
- 7. Q. The last famine was very intense and very long; nas there any difficulty about drinking water f—As far as I could learn there was no practical difficulty about drinking water during the whole of the famine. There is always a slight converty of drinking water in the dry season, but I doubt if it was very much worse during the famine year.

- S. Q. We have had evidence that there was a stimulus for the time being given to well irrigation by the construction of kachcha wells?—It made no really meterial difference. There were many hundreds of kachcha wells, but these were dug only for temporary use.
- 9. Q. Did they nat lighten the stress ?-They made no motorial difference. I doubt if 1,000 wells wore dug and that would only mean about 1,000 acres.
- 10. Q. You dan't see any prospect of improving the means of irrigation?—Of all the districts in the Presidency, Brooch is the one which least requires ortificial Irrigation, because, with 17 inches of rain, good crops can be raised.
- 11. Q. You have had only one femine since you can remember ?—Yes, only one within the memory of men; in 1809 we had only 12 inches of rain and the mensoan ceased. During the last twa year, there may have been famine in other parts of Guranat, but there has been no distress in Brown which would be thought anything of, if there had not been a famine the year before. This year with 22 inches of rain we should have had a 16 anna erop in a greater part of the district but for damage done by rats.
- 12. Q. Famine has occurred once and so it may occur again P—Looking up at the statistics of rainfall there seems to be no ground for the popular idea that the rainfall has diminished. The figures show that the present rainfall is better than before.
  - 18. Q. Three years ago you had famine ?-Yes.

Mr. Logan.

- Mr. Logan.

  14. Q. It may come again?—Yes, it may of course, but looking at the averages, there seems to he no reason to 11 Dec. 01. fear that famine will occur for nucther 50 years.
  - 15. Q. Have you any water-logged parts in your district and are they increasing?—No, I should not think that they are increasing. Certain areas were water-logged, but we have dmined them There is a water-logged area still in Ankleshvar, but I have no reason to believe that it is materially increasing.
  - 16. Q. Is there any questi m of remitting revenua on account of it, or of reducing the amount?—There is a letter from the Government on the subject.
  - 17. Q. Do you know of any good done by drainage?— The people were pleased with the drains for the first two or three years, as they could grow cotton instead of wheat. They are now complaining that they wash away the surface soil
  - 18. Q. Have you had occasion to go into these complaints ? -Ne, I have not had time to look at the lands myself. I have only just joined the district since this question cropped np.
  - 19. Q. The Mamlatdar made personal inquiry and his report has been sent to Mr. Honlo?—Yes, that refers to the complaints mode by the people that the channels had done great injury.
  - 20. Q. Has the report gone to the Public Works Department for consideration !—Yes.
  - 21. Q. (Mr. Ibbetson.)-Is it included in Mr. Beale's report.
  - 22. Q. (Mr. Muir-Maskenzie)—Yes; (to the witness)
    —Do you consider that the report can be relied on ?—Yes,
    I think so. I reported that in Wogra people said that the
    land had been spoiled, but that elsewhere there was not the same comploint.
  - 23. Q. (The President.)—I suppose that water-legged tracts bure done best during the last 2 or 3 years?—There is no doubt of that.
  - 21. Q. (Mr. Higham.)—Could you tell me how many wells were constructed in Jambusar?—One hundred and sixteen.
    - 25. Q. Are they kachcha wells ?- Yes.
  - 26. Q. The majority of these 116 wells were left incomplete?—Yes.
  - 27. Q. How are they dug ?-The people excavate a short ay down, and when they get sufficient water they leave the well in that State.
  - 28. Q. The Mainlaton who came here just now said in reply to a question that they were nil pakka wells?—I suppose he called them pakka because they cost Rs. 300. He may have called them pakka but they were very poor pakka wells, they have no steining or very little.
  - 29. Q. Were advances given for them?-Yes, takari was given.
  - 30. Q. (The President)—I see Rs. 38,730 was given f.-Yes, that was the takari advanced for the 116 wells.
  - 31. Q. That is Rs. 334 npiece ?- Yes.
  - 32. Q. (Mr. Higham.) They irrigated 2,000 ncres? They did.
  - 33. Q. Whether they were pakks or kackcha?—Yesonly in that year; they were need only in the famine; no one had made any use of them since.
  - 34. Q. Will they not he used in another famine?—They will all be filled by then. This year our minfall was fifteen inches below the average, and still they did not use thess wells.
  - 35. Q Could you not insist on their completing them having given them fakasi for the purpose f—It is generally found that the man has spent all the money he was given and he would again apply for more money; we cannot so control the expenses as to be cortain that he has spent all the money on the well.
  - 36. Q. He usnolly spends it on something cle?-Yes, very lorgely.
  - 37. Q. Do yon know any of these reclamation works made in Hansot?—No; but elsewhere private reclamation works were undertaken, but none of them succeeded.
  - 38. Q. I suppose it is only a matter of time?—We gave the people 20 years to reclaim the land; but the land is not reclaimed except partiolly, not enough to pay the cost, now they say it is not reclaimable.

- 39. Q. You are speaking of the reclamation scheme of some years ago ?—I am speaking of the reclamation of salt
- 40. Q. I was referring to the works made during the famine ?—I have not got any personal acquaintance with these works.
- 41. Q. You don't know how they worked?-No; but my impression is that you cannot reclaim salt land in under
- 42. Q. It is a waste of money trying to reclaim theso lands?—Yes; in the Wagra talula reclamations v ero attempted and enormous same of money spont on them and yet the reclamations have not paid. In some cases the people have been absolutely ruined to my howledge.
- 43. Q. It may not pay profit from a speculative point of view, but is it worth omploying relief labour on ?—No, I should not think so.
- 44. Q. Would you employ fumine labour on tanks?-No.
- 45. Q. (Mr. Ibbetson.)—You doubt whether the work will be profitable?—Yes. Nobody is satisfied with any of the tanks dug in my district by famins labour. The lorge tonk which you saw is of little good for irrigation and is not required for the supply of the city, which was already sopuled with mater. plied with water.
- 45 Q. Four or five very lorge tanks would be of ne value? -I could not say until I had seen them.
- 47. Q. (Mr. Higham.)—What else would you suggest for your famine labour?—Employment on good reads, which are the great want of the district.
- 48. Q. Where will you get your metal from ?-The metal would have to be brought from ontside, as we have not got metal in the district.
- 49. Q. Would you use famine labour lo make the banks?—Yes,
- 50. Q. Must the roods be metalled?-Tes, if they are intended to last any length of time.
- 51. Q. Work of that sort like railways employs very little labour in proportian to its cost ?-Yos, but we should have something to show for our money.
- 52. Q. (Mr. Ibbetson.)—Do you think you would be able to keep up these metal roads, supposing you made them in the famine?—Yes, the Local Board could do it.
- 53. Q. They would have to import metal?-Yes. We hove made unany reads and keep them is repair; the cost of making a new road is about Rs. 10,000 n mile. The Board now does n few miles every year hesides repairs. If Government provided the capital cost, the Board could spend on repairs the meacy which it new spends on new work
- 54. Q. Do you expect Government to pay for the famine labour and to give you the metal free?—It would be just us good as spending money or necless tanks.
- 55. Q. Not in nseless tanks but on feeding a starving people You propose to employ the labour on the earthwork of roads and to spend twice as much in importing road metal?

  There must be some increased expenditure involved to Government. The Government would have to bear all the expenses, the Local Loards could not, especially in a famine # year.
- 58. Q. I find in your note no expression of opinion obout tank irrigation; you have strong reasons against trusting to well irrigation. Would you do anything to extend tank irrigation?—I do not think tank irrigation is irrigation at all, looking on irrigation as protection against finding; for the or the strong trust tanks of the tanks. when the rains fail the tanks fail.
- 57. Q. Put does not the increased yield put the enliva-tor into a better position to resist famine, and thus there is less likelihood of his coming on relief?—That is so.
- 58. Q. I sappose tank irrigation is profitable to the people?-Yes, for rice.
- 59. Q. Do you think relief labour could be usefully employed is cleaning out the tanks?—I would bave said that tanks are a useful form of relief until 3 or 4 months ago, but I now see cause to doubt it. Wherever I go peopletell ms that tanks are none the hotter for being cleaned.
- '60. Q. Do they give any reason for that?-The old hottom is disturbed.
- 61. Q. Do they ever nek for new tanks?—They ask for ne excavation of village tonks which are used for irrigntion and for cattle.

- ·02. Q. Would you deepen the village tanks?—I doubt the useful effect of opending memory in deepening village tanks; the soil has cracks, so that the more we deepen the tanks the more the water disappears.
- 68. Q. Do you think it is worthwhile doing anything to extend irrigation in Breach?—I think Breach district does not require any extensive scheme. The people are exceedingly shrewd, and good collivators would dig wells no doubt; if they thought wells of any use they would dig them and they can get taken if or the purpose. My experience is that they won't dig wells oven if you gave them the money free; if they did dig they would not use them as it does not pay to draw the water.
  - 61. Q. The unirrigated erop is so good ?-Yes.
- 05. Q. The unirigated crop is so good rates.

  05. Q. Suppose you had another famine next year and relief labourors to be employed somehow, do you think you could do any good to the district by employing them on irrigation works of any cort?—Ro, I should employ them, in the first instance, in digging out village tanks—the area for irrigation tanks is very restricted; it would be simply throwing away money to dig irrigation tanks in black cotton voil, where people are quite satisfied with getting their cotton. They don't want irrigation there.
- 66. Q. They would not substitute rice for cotton ?—I think on the whole that they would not.
  - 67. Q. Thoy prefer cotton ?-Yos.
- 69. Q. Apart from the question of assessment ?—Yes, it is a very hardy crop and a profitable ouc.
- 69. Q. (The President.)—Has the question of employing famine labour to make navigation canals in Breach been considered?—Never to my knowledge.
  - 70. Q. (Mr. & Rajaraina Mdlr.).—There are several tanks in the district?—Yes.
  - 71. Q. Do you think it would be possible to increase their capacity by raising the bunds; you object to disgling and disturbing the soil?—I could not give a professional opinion on that subject, as I am not on Engineer.
  - 72. Q. Is it not generally known that their capacity deteriorates owing to neglect to repair them. Could not famine labour be usefully employed in that way !— Yes, if the Engineers certify that the raised bunds would increase the capacity of the tanks,
  - 73. Q. (Mr. Muir-Mackenzie.) In some parts of your district there are considerable areas of waste water-logged lands? No, not a very large area.
- > 74. Q. An appreciable urea f-Yes, but except in Ankleshwar they are mostly all drained.
  - 75. Q. Do you think that drainings is the best remedy for them?—I do not know any other remedy. It is rather a dangerone thing to do noters it is done very carefully. You may take away more water than you ought to. I saw the draining eachemo that was first started in 1885, it was founded on the basis of draining off 6 luches of rainfull per day.
  - 70. Q. It is only one inch here in Olpad F-I am referring to the report of Mr. Day; he says he found that the heaviest rainfall on any one day was 11 holes, so he prepared a channel to earry off minfall in 2 days.
  - 77. Q. Would it he may use running drains into tanks in water-logged areas with a view to oreate vice cultivation?—I think it is the best thing to drain into tanks below the drains.
  - 78. Q. If you put regulators in the drains you might, to some extent, obvince the danger of taking off too much water f—That is a question for the Engineers to answer.
  - 79. Q. Was famine labour employed on these reclamations you spoke of P.-No, it was private enterprise.
  - 60. Q. (Mr. Ibbetson.)—You say reclamations might take 30 years; but will they succeed in the end?—Of two mon who undertook extensive reclamations one is stone broke. The other has large means and get a good deal of fertile land in conjunction with his reclamation. He won't ted me he has succeeded, for next year the Government assessment falls due, but I think he will stick to his reclamation.
  - 81. Q. (Mr. Muir-Mackenzie.) Do you think the term of granting taken ure sufficiently liberal f-Yes, I don't

- think the rayats ought to be given money at a lower rate of Mr. Loganinterest than we have to pay.
- 82. Q. Could any further simplicity be introduced in the procedure of granting advances ?—I believe that during the last two or three years taken has been given with remarkable simplicity.
- 83. Q. But in ordinary years f—Inquries must be mado; first of all you must know the man's position, whether he is solvent. We ask the Mamlatdars to make inquiries.
- 84. Q. Do you think they are n bit clow?—Yes, in ordinary times, they are; but they have not been slow during the last three years.
- 85. Q. Do you believe that there is misapprehension and unfounded fear on the part of the people that if they make wells either out of their own resources or out of takeri advances they will be charged enhanced assessment contrary to the law P—Yes, they fear enhanced assessment if the well is made in their own land.
- 88. Q. They would be afraid of something more than if they left the land dry?—Yes; it is reasonable, as nobody knows to the centrary.
- 87. Q. It is in the law (reads from the Code, Section 107)?—At any rate the general feeling is that Government is luclined to assess improvements at overy new revision. This morning I travelled along with a wealthy Parseo gentleman who said his assessment had been enhanced 1,200 times in the Revision Survey owing to his baving improved his land.
- 83. Q. No you believe him?—I don't believe him so far as the 1,200 times are concerned.
- 80. Q. You don't think the provisions of the Code are understood by the people?—No, I don't; but I may add that I think that when it pays they will make wells regardless of enhancement.
- 10. Q. Do you think, given took irrigation, rice crops would be more profitable than cotton t—I do not think so, the people would never change cotton for rice. The people are very lary. If an enterprising oultivator uses a good deal of manne with irrigation, I think that a rice crop might be more profitable than a cotton crop, but I am doubtful. There is so little rice in the district that I have never made a comparison of the profits. Cotton gives from Rs. 30 to Rs 46 per acre.
- 91. Q. Mr. Mollison said it might give Rs. 100?—I doubt that except in very exceptional land. The people like growing cotton, because it gives them very little trouble.
- 02. Q. My point is this, if famine relief labour is employed upon digging rico lands it might help the people to grow a mare profitable crop?—I am not sure how far it is a more profitable crop. I have not studied the question. I am very doubtful whether, if rice tanks were made all ever the place, the people would change their cultivation in black roll.
- 63. Q. Aro you aware that rice Is grown with cotton. The notion is intermixed with rice?—Yes,
- 94. Q. I understand from Mr. Mollison that in the year of excessive rainfall the cotton may fail and rice would succeed f-Yes.
- 95. Q. Under these circumstances would it not be possible to grow rice and make it a safer crop f—They have adopted rice in certain areas where there is a heavier rainfall or when they get surface drainage collected.
- 93. Q. You don't agree that the Nerbudda and Tapti would offer splendid opportunities for irrigating large areas of very valuable crops in the Breach district?—No.
- 97. Q. It is said that during the last 30 years there has seldem been a year of good rains. The rainfall teturns contradict it. In former times the people need to say that Breach could not have a familie, because they could set a cotton crop with 17 inches?—I don't ogree.
- OS. Q. We were told by an Assistant Engineer that the population in Breach was without occupation for seven months in the year?—They are fully occupied from June to March or for 10 months in the year; our difficulty generally is the deficiency of labourers.
- (The President).-We were rather astonished at what fell from that gentleman.

Mr. Jivanji.

WITNESS No. 40.—MR. JIVANJI LIMIIBHAI, Lond-owner.

Memo. by this witness not printed.

- 11 Dec. 01. 1. Q. (The President.)—Of what place are you a resident ?—Of Ileo in Broach.
  - 2. Q. Yon say in your Momorandum "during the last thirty years I have seldom seen one year of satisfactory and well-timed rain, and then the orops above mentioned require one or two waterings by artificial means." Has there never heen too much rain?—Sometimes there has been and sometimes scanty rain; it has not been equally distributed.
  - 3. Q. There have not been many years in which there has been a 16-anna crop? No, never.
  - 4. Q. Yoo say "people having black soil lands are anxious for tanks." In the Broach District, I understand, they prefer cotton to rico. Does cotton not pay better?—No, rice pays better.
  - 5. Q. You say "the Tapti and the Nerbadda and the Kesm rivers afford oplendid opportunities for irrigating large areas of very valuable and highly productive lands in the Surat and Broach districts." Are not most of these lands black cotton soil?—Yes.
    - 6. Q. Can they be irrigated by a canal ?-Yes.
  - 7. Q. We have had a great deal of evidence to the effect that they do not want water 2—The rain is not equally distributed so they require one or two waterings for the cotton crop.
  - 8. Q. Does the cotion crop not require water ?-- No, it does not.
  - 9. Q. Do you think people living near the Tapti-Norbudda and Keem would be glad to have canals running through thore ?—Yes.
  - 10. Q. Would the water not go into the oracks in the land and be lost F-It would not go far.
  - 11. Q. Yon say "far from any encouragement heing given to well construction by means of concessions or grants, such construction is positively disconraged by an excess assessment bring chapped on on account of the water-supply from the wells." Is that the case?—Yes, everywhere they charge a water tax.
  - 12. Q. Do they charge a man who makes a well more than if he did not make it?—Yes, the rayats have to pay more.
  - 13. Q. Do you mean if a man digs a well in his own land he would have an extra osces-ment put on in consequence?—Yes, two or three years ago this practically cased.
  - 14. Q. Then it is no use talking about it now. You are no advocate of having drains in talukas like Ankleshar and Oplad. I have heard that people complained that the drains do harm ?—It is a mistake on their part to say so.
  - 15. Q. Several witnesses have told us so i-Dralos are especially required in water-logged villages.
  - 16 Q. (Mr. Muir-Mackensie.)—Is there much waterlogged land in Ilao ?—Not in Ilao, but about three miles away there are water-logged villeges.
  - 17. Q. Is this within your personal knowledge !- Yes.
  - 18. Q. (The President.)—You say "hulding wells should be encouraged and advances should be freely granted and no interest charged on the same," do not people make wells for their own private use?—They have no means.
  - 19. Q. (Mr. Higham.)—Have yoo any land of you own?—Yes, about 400 acres in the Broach District.
  - 20. Q. Have you any wells !-Yes, one well which irrigates five to six acres
    - 21. Q. Where is that well ?- In liao.
    - 22. Q. Do you work it ?-Yes.
  - 23. Q. Why have you no other wells?—Because it does not pay; the cost is so great.
  - 24. Q. Do you recommend that Government should boild wells for you and for others?—That would be very good, the people would like it.
  - 25. Q. It would not pay Government any more than it would pay you ?—In times of drooght and scan; y rain it would pay.
  - 26 Q. Do you propose that Government should pay the whole cost ?—No, advance the money without interest.
  - 27. Q. Aud in what time should it be recovered ?-In 10 to 15 annual instalments.

- 28. Q. If you sunk a well for yourself, do I understand you to say, that your assessment would he increased !— No, that practically ceased two to three years ago.
- 29. Q. In future there would be no charge?—Then the people would sink wells by taking takavi.
- 30. Q. If you could get advances, would you sink them?

  —One or two wells.
- 31. Q. What is your remedy for the Breach District ?— Cacale from the Nerhadda and Tapti would be best.
- 32. Q. In ordinary years you got more water than you maet?—Yes.
- 39. Q. A canal from the Nerbudda would only be for dry years?—In dry years the water would do good.
- 31. Q. In the intermediate years you would not like to pay for it?—The rayats would pay something for the
- 35. Q. Supposing they did not want the water P-Even then they would pay something extra.
- 36. Q. Then they will want to take it ?- Yes.
- 37. Q. They will in that case put too much water on the land ?-No.
- 39. Q. What would they pay if they did not want it?—Re. I extra per nero whether they nanted it or not.
- 39. Q. What reason have you for saying that?—They want it for a crop every year and would willingly give Re. 1 per acre, if they water the crop they will get a 12-sanna crop instead of a 6-anna one.
- 40. Q Wes there great loss of cattle in your district ?-
  - 41. Q. Doe to what ?- Want of fodder.
- 42 Q. Have you any recommendation to moke for meeting that difficulty in the inture ?-Government should keep it to rendiness.
- 49. Q. Why cannot you keep it yourself ?-Government have receive forests.
- 41. Q. What becomes of it now; is it cropped every year?—It is destroyed by fire now,
- 45. Q. Is it cut for the merket every year f-No, it is simply wasted.
- 46. Q. Do you know if private contractors ever offered to cut it !—It would not pay in ordioary years.
  - 47. Q. Therefore Government should do it ?-Yrs.
- 48. Q. It wen't pay Goronment either !- No, it would not.
- 49. Q. In a famine year what should Government do ?— Bell it to the people and they would willingly purchase it.
- 50. Q. But they would have no money then ?-They would take takavi and purchase it.
- 51. Q. Supposing private contractors on waste lands were allowed to cut the fodder on low terms !—There is no great demand io ordinary years and so it would not pay.
- 52. Q.i(Mr. Muir-Mackenzie.)-Somo of the land la gorat and some black soil !-- Yes-
- 53. Q. Which requires most water for Irrigation?— Goraf requires more water than black soil. In sommer time black soil requires a lot of water on account of the cracks.
- 53. Q. Does not black coil run togethor and get sticky? -- Not very sticky.
- 35. Q. In what soil are these wells of yours !-- Partly to black soil and in beser soil.
- 56. Q. There are fewer wells in Broach that in the Kaira District ?- Yes, there are more wells in Kaira.
- 57. Q. Thet seems to look as if wells pay hetter in sandy than in black soil. Does tobacco grow in hiack soil?—Tes, if properly manured.
- 69. Q. Why have people not made wells in black soil as they do in gorat ?—They have no means.
- 59. Q. The soil does not make any difference to their means?—Some people have made wells in black soil also, but they are very few; the expenses ore greater.
- 60. Q. You are a member of the District Local Board !--
- 61. Q. I have understood that you have a great deal of influence with the people ?- Some people think so.

- 62. Q. I remember you induced them to do n good many useful things, don't you think a man of your influence could induce the people to repair their tunks ?—I could induce them if they had moons.
  - 63. Q. Have you tried P-Yes.
- 64. Q. Have you succeeded F. I succeeded in getting some portion of the toluku to give u subscriptice.
- 05. Q. Why could not you make the people do it them-selves ?—They ere very peer.
- 06. Q. They govo money for the contribution?-The contribution is a small portion.
- 67. Q. Still in tanks where there is not much to do, could not they do it themselves ?-Yes.
- 69. Q. They never do !--People cannot afferd it, when a thousand or 500 are required, they could advance Rs. 10 ar lo but not more.
- 69. Q. No person of influence could induce the recopic to repair their tanks?—They are Government tanks and Government charges a water-tax, it is the duty of Government to repair them the people contribute ene-tenth.
- 70. Q. Supposing Government remitted the tox, would the people repair the tanks ?-Yes.
- 71. Q. A mambatdar said in evidence that out of Rs. 6 assessment about six names was tank assessment?—Ho was wrong; as far as I know the assessment is Rs. 4 to R. 6 per agre, and rice Rs. 10 to Rs. 16; that is the water-tox.
- 72. Q. Even if rice is under n tank it would never pay according to the mamintdar?—That would be a sub-soil nuter-tex, not a took tax I think.
- 73. Q. If Government remitted that tank tax and nothing else, would that be a sufficient inducement to repair their tenks?—Rs. 6 per sero is a great deal.
- 74. Q. I understood you to say that It was the sab-soil that made up the big tax?—The sub-soil is from Re. 0-6 to Re. 0-12.
- 75. Q. Would you like Government to edronee money free of interest ?—Yes.
  - 70. Q. And the capital to be repaid !- Yes.
- 77. Q. Supposing Government did not osk for repayment of capital, but charged an assersment on wells f-Somo people would like that.
- 78. Q. Would you supposing Government gave yon the amount you required for the well and then asked you for some tax per acre on the laud irrigated by that well P-Yea.
- 79. Q. How much would you be prepared to pay ?- Rs. 4 per sere.
- 80. Q. You think there is a lot of water-logged land in your neighbourhood ?-Yes.

- 81. Q. Whot is the best thing to make that fit to be Mr. Jivanji. taken up for cultivation again t.—Droinage.
- 82. Q. Some reduction of assessment would not be sufficient P-The assessmeet should be reduced besides boring draios.
- 83. Q. Do you think mny moderate reduction of assess\* ment without dreins would make the people take up these lands P-No.
- 84. Q. If a lorge conal were made through Ankloshvar taluka in the part of it which borders on the Keem river and the Nerbudda that that would be on excellent thing for the employment of labour ; a great number of people would be omployed ? - Yes.
- 85. Q. Do a great number of people require employment ?—Not is ordinary years.
- 86. Q. Have you difficulty in getting labour in ordinary years ?—Yos, often.
- 87. Q. Do you get people lo harvest your orops from a distance ?— From six to ten miles.
  - 88. Q. Not further ?-No.
- 80. Q. In the Deccon people travel from 50 to 100 miles f-That is not the case here.
- 90. Q. Which would you rather see n canal or more roads ?—A cacal.
- 91. Q. Does not the District require roads very much? -A eart track would be better.
  - 02. Q. Sometimes people den't like roads ?-No.
- 93. Q. You have told us that there ere mony bad seasons and that some are due to excessive roln ?-
- D.L. Q. And that increases the water-logging P-Yes, only one year in thirty have I seen excessive rain; that was in 1879, there was then more than 110 inches of raie.
- 95. Q. I see that ie the statement of rainfall from 1887 to 1901, ottached to your paper, you show 57 inches in 1803, is it more important that the roin chould be well distributed than that it should be of any particular quantity?—Yes. If min is sufficiently well distributed, 50 inches will be enough for cotton and wheat.
- 93. Q. Did you erer before 1900 have a severe fedder scarcity?—No.
- 07. Q. A good many wells were dug in the famine year? -Yes, kacheka wells.
- 08. Q. Were they of any use ?-I dng six or seven wells, but they did not pay.
  - 09. Q. Was the fedder grown under them valuable?-Yes.
- .100. Q. They kept alive your cattle !- Yes, but we could not get sufficient water of the time.

## TWENTY-FIRST DAY.

### Dhulia, 14th December 1901.

WITNESS No. 41 .- Mr. A. H. A. Sincon, I.O.S., First Assistant Collector, Satara.

Answers to printed questions.

Point 6.—This is the only point on which I wish to express a decided opinion. Having lived for avo years among the patasthal irrigators in the north-east part of Nanik district. I am firmly convinced of the advantages of the pot-bandhara system and of its applicability to other parts. The bandharas were for the most part constructed in old times. There must have been 40 or 50 in my charge irrigating various areas from 600 acres to 16 or 20. All Government do to the part of the part works and see that the 14 to keep up the handharas and head works and see that the puts are sound. The villagers have to clean the pats and distribute the water. The Executive Engineer, Infigation, distribute the water. The Executive Engineer, Irrigation, Khandesh, can doubtless give the figures of expenditure, as well as those of water-rates, which vary greatly, and of total income. The rates are fixed, and ne remissions are given for failure of water as a rule. I tried to get exceptions made in some very hard cases. The new bandhara at Kanasi, Taloka Kalwan, and the new bandhara at Morana Sandas, Taloka Baglan, were built during British rute. Divisions of pats have been made at several places, e.g., Valvada, Taluka Malegaon, Jnykheda, Thluka Baglan, Nikvel, Taluka Baglan. These divisions are usually to avoid creation by nallahs, etc. They were not done as famine works. There

are no District Board baudianes. There is an Inamdar's Mr. Simcox. bandhara at Arni, Taluka liaglan. It is not well kept up and is very old. I want the Buglan system to be tried in Satara district. I should like an experiment to be made on the Krishna just below Wni. If that succeeded, more might be done. I spoke to Mr. Beale about this matter when he was in Satara. He said he hoped to take it up nfter scoing the system at work near Malegaon. Baudharas are no use to increase the water-supply for drinking. They are no use to increase the water-sapply for drinking. They should only be unde on living streams and if there be a living stream there is ample drinking water. I think the streams might, in some cases, be increased in volume by the construction of storage reservoirs near the Ghâts, particularly in the case of the Girna River at Chandkopur (this is an Imperial work already commenced in the fomine), and in the case of the Alexan River above Mulher (this project is not occupieto).

There are a great many improvements to existing bandlarns and pats in Baglan and near it which might be made very cheap. I sent in a list of these to the Collector of Nasik when I left charge last December, and another list dering the rains when the Commission was first announced.

Mr. Simcox. These are matters of detail affecting but a few acres each.

Still they ought to be done.

14 Dec. 01.

Still they ought to be done.

Point 7.—I have seen o great mony wells and advaced a great deal of money for them in the Molegaon charge. But I have no figures hy me. I may he able to couvey some information orally in o general way os to wells. It is my opinion that they are not so useful as bandharas where the lotter ore available. Well-irrigation is not suitable to the Maratha character. It takes too much time and labour. If he can get on with a dry crop he generally will not troable to work the mot. But with a good pat he has only got to watch the water ran. Hundreds of wells are deserted as soon as o fomine is over. deserted us soon us o formine is over.

Point 8.—1 only know of ooe cass at Patna, Taloka Malegnon. The water-logging is artificial. This is oue of the small improvements I spoke of at the end of point 6.

the small improvements I spoke of ut the end of point 6.

Point 9.—The ooly remarke I could offer which weald not better he made by Public Works Deportment Officers are as to village tanks and small road works in the Malegaoo chorge I had 14 village tanks deepened in May and Jane 1900, and two smell works to moke roade good eneagh for country cauts over passes where only foot traffic had previously existed. All these small works were successful in their objects. The tsuks were helding water well, and were much appreciated by the villagers when 1 left. The pass roads were also u great souvenience. These small works can be started in one form or another in most districts. The difficulty of supervision is that most felt. If a lorge establishment is appointed, it swallows up the grant for the work or a disproportionate part of it. I found that near Malegaon local gentlougon undertook the supervision a lorge establishment is appointed, it swallows up the grant for the work or a disproportionate part of it. I found that near Malegaou local gentlouou undertook the supervision of such works were such as would benofit them and their neighbours, oud there was a spirit of good fellowship which mode mattere easy. This could not, I fear, be expected in ull districts. I should like to see the Chandkapur Tank and the Girna Left Bank Canal project completed. It has been banging ou for 25 or 30 years. I believe it would pay better thou most similar projects. On too other points I do not anticipate that any remarks of mino would be of mach value.

#### II. -General.

1. The Malegaon Division of Nacik district. I was there five years and was impressed with the excellence of the pat-bandhara system and want to see it extended to other parts, my present charge (Satara) being one ench

#### B .- Canals of Continuous Flow.

B.—Concile of Continuous Proc.

Preliminary.—I take it that what is meant by the shove heading is what I should describe as "large canals," i.e., such as irrigate lauds in many villages cod whose coarse extends over many miles. The canols of which I am on advocote are such as only irrigote the louds of one village each as a rule. They originate io rivers near their sources which are dammed with masonry dams, and the canols are sopplied with elementary head works which can be managed by the villagere themselves. The system is only applicable in the Decean to the country within 50 or 60 mits of the Ghâts. Boyond this the rivers grow too wide and deep as a role to admit of the economical construction of each dams. The typical river to exemplify the system is the Mosam which rises in Salher Fort and joins the

Girna uear Malegaon—a coarse of ubout 52 miles. For over 40 miles of that distonce it has a bandhoro practically every 1½ to 2 miles, sometimes closer. Out of the river at each houdhara flows a small canol or påt obout 1 or 1½ miles loag, which irrigates village lands in varyiog quantitiee—rauging, so far as I remember, from 20 to 600 ucres. The bandharas were in every case hot one hoilt in praBritish times. All that we have done is to improve the head works and to divert the obaonels in places where erosion was taking place. The cultivation in that port of the conotry has grown to he a fice ort, and the crops produced are magoificent oe a rale. But the system seems to he n purely local growth. Trao, one finds kachcha handharas in most ports of ihs becam, but enything like the pakka bandharas of Masik and Khaudesh are very raro. The special points of the system uppear to me to be (1) cheapness and (2) essiness of working. Once the dam ond head works are put up, there are no expenses and no establishment required nulses, of coarse, the dam be woshed away or some such calamity happen. The irrigators are responsible for cleaning the pats and distributing the wnter. The dams themselves are not expensive, as they are erected only where the river hed sapplies a good rock foundation. Such sites are available at frequent intervals.

7 and 8. The irrigation being ancient, there is no means of calculation the invesses in visid on value of the load.

7 and 8. The irrigation being ancient, there is no means of calculating the increase in yield or value of the land under yats. Drought does not affect them if the rivers and sites are well obesen. Alalegaon has not had anywhere near its normal rainfall since 1896, but when I left lost year the patesthal land was still doing well. The flow of the rivers was much reduced, it is true, but we cannot expect to have a recurrence of four or firs years' drought.

9. (3) The pots all belong to Government. The rates varied from shout Rs, 5 to Rs, 15 per acrs. The last rate was that of a few villoges near Malegson. Dry land la them was assessed at Re. 1 to Rs. 2-3 per acre.

10. The system is that each irrigating village has one or more "patkoris" or "hovildars," who are village serrants responsible for distribution the water in accordance with the terms fixed by the village panel. These men receive remuncration, as other village servants do, as watendors in the shape of main land or cash allowonees coupled with haks. For the annual silt-clearing and on other emergencies the Patil calls out all the principles of the province of

11. There was no case of too profuse or extensive irriga-tion that I remember. The channels merer wont far from the river, and the irrigated lands generally drained thom-selves into the river to which there was a natoral slope of the land. I only remember one cose of water-logged loud at Patna, Tolnka Malegaon, of any extent. When I left I was trying to get the Executive Engiseer for Irrigotion, Kbandesh, to remedy this by making a cut to the river.

I hars put my remarks under B, because a properly placed bandhara ebould ensure a cootinaous flow. No doubt many of the pats in my former charge bave been decidedly intermittent since 1898, especially these on the smaller tribotaries of the Giran. But then the drought in that particular charge has been extraordinary. I may instance one village (not irrigated but within two miles of the rivor) where corn two feet high has not been grown, eince 1895. In such circumstances small streams must run dry. On the other band, the pats on the Giran itself and most of those on the Mesam were working as usual. most of those on the Mosam were working as usual.

- 1. Q. (The President)—You have bad some experience of the Nosik district?—Yes. I was nearly five years in the Malegaco charge which adjoins this district.
- 2. Q. The country is similar to this district?—Very similar to Pimpalner taluku.
- Q. Were you there right through the famines of 1896-97 and 1899?—Yes.
- 4. Q. Was the former the worse of the two famino years? No, the latter wosfar worse. The number on relief in the latter famine was five times as large as that in the former.
- 5. Q. You are intimately acquainted with the bandbard system ?-Yes.
- 6. Q. The system is pecoliar to these parts ?—I have never met it in such profusion elsewhere. I have never seen pakka bandharos elsewhers mode by the people of old on their own account. There are pakka bandharas in other parts made by Government.
- 7. Q. Do you know the haodhara close hero f-No. I understand it has a tank to feed it. The old bondhares . had no tunks,
- 8. Q. Never ?-No.
- 9. Q. The one referred to is a better sort of haudbara?—Possibly. The old bandhora; were made simply by diverting the living stream. The Mossm River runs through the Malegson charge for 50 or 60 miles, and ot almost every mile there is a bandhora. Usually the only masoury work connected with each is the cluice at the head. Each bandhara as a rulo supplies one villags only.
- 10. Q. Does this river flow oll the year round ?-Yes.
- 11. Q. You say the bandhara sopply only one village ach ?—As a rule, sometimes one bandhara supplies two villages.
- 12. Q. Mr. Gahagau said that soms eerved more villsges ?—He may have heen referring to the Paujhru River which ruus throagh Pimpaluer ond Dhulia talukas.

The Pimpalner and Baglan talnkas are not supplied by the same stream.

- 13. Q. Mr. Gahagan said there were disputes about the stranms in various villages P—Yes, owing to short supply of water. For instance, I have known cases where the people of one village have unfairly heightsned their bandhara by making mud dams on the top of the masonry. This gives them more than their fair share of water.
- 14. Q. The people on the lower course of the stream are jealons?—Yss. These quarrels are only sommon when the streams run low, and it should be remembered that since 1897 we have averaged only 11 or 12 inches of rain in the year instead of some 25.
- 15. Q. (Mr. Ibbetson.)—Was there plenty of water in 1896 r—Yss. At the end of July 1896 10 inches of rain fell in one day at Malsgaon. This heavy fall filled all the
- 10. Q. The streams went on running although there was no rain after July ?—Yes.
- 17. Q. (The President.)—We saw a lot of streams in Gajamt which do not flow all the year?—I do not know Gujarat. The rivers hereabouts have large catchingua. The simplified the applicate of the water-peoply in 1896 I may say that there is a small ditch which runs into the Messay Usually it is dry, but in 1896 it flowed all the year round and irrigated 200 acres. The people say that it flows only once in 12 years, in Sinhast year.
- 18. Q. Each bandhara bas a caual leading down from it?—Yes. The channels are managed entirely by the villagers, except on rare occasion, e.g., whou a channel is washed away by a flood. Thou Government repair it-Ordinary repairs, such as sitt clearing, are done by the
- 19. Q. De you know how they manage the distribution of water? Have they any fixed plane?—They know their irrigated land thoroughly. The rotation is all cut and dry, and is known to the whole village. They have no occasion to roter to the Public Works Department in these matters.
- 20. Q. You say in your written evidence "The new bandling at Kanasi, Talaka Kalvan, and the new bandling at Morana Sanda, Talaka Baglan, were built during British rule f"—At Morana the Public Works Department built o new bandhara to raise the level of the canal. At Kanasi the old bandhara was ruined and was entirely robuilt. The irrigating class had all left Kanasi, and now irrigators were brought in in my time and irrigation was recommenced.
- 21. Q. Did the new caltivators' ancestors live there P-21. Q. Did the new collivators' ancestors live there?—No, they cause from different parts of the country. I advertised the laud to be given for urrigation through the talaka officers. Alr. Stowart really started the idea which was carried out in my time. The old villagers had ell fallen into the lauds of the sevkars, who are Telis by caste, that is, cilsellers. The savkars got possession of the land, but did not take the treatle to irrigate. The old villagers all left the village. In 1898-09 we offsred the land free of occupancy price. A let of people were collected from various parts of the district, but none belonged to the old remaintien. old population.
- 22. Q. The old bandhara was entirely rained ?—Yes. The new bandhara is a maguificient one.
- 23. Q. The people usually resent new bandbaras ?-Yes. Thore is generally much irrigation on each stream that there is little room for more. There is plenty of irrigable land, but the water in the stream will only irrigate a critain quantity. When a man bays up a piece of hand adjoining the present irrigation, he often asks to be allowed to irrigate it. This can seldom be permitted, for the people generally know the limits of possible irrigation, and have already carried it as far as possible.
- 21. Q. Do you know whether at the tail end of the river all the water is used up P—The Commission is about to see the Janada Canal, which is fed by the Girna River below all the bandharas.
- 25. Q. (Mr. Robetson.)—You say all the bandharas take off above the Jamda Canal ?—Yes. The Girna is a very strong-flowing stream. The great rivers such as the Bhima and Krishna dry up, but the Girna never.
- 20. Q. (Mr. Muir-Mackensie.) Does the Krishna dry up F-Last year there was no stream running. I have seen the Godanari also dry, but the Girea always runs.
- 27. Q. The Girna runs through the Malegnon charge ?-
- 28. Q. You say you want the Bagian system to be tried in Satarn?—Yes, very much.

- 29. Q. Is there anything to account for the comparative Mr. Simcox. failurs of kackéke bandbaras?—I have seen some such bandbaras laboriously built of brushwood, stones and earth. 14 Dec. 01. In a few moments during a thunderstorm the stream may wash all this away and destroying all the work and rendering the avanaged and ing the exponditure useless. A fresh start is uceded, and one season may ontail great trouble and expense. ing the expenditors usaless.
- 80. Q. You say "I think the streams might in some cases be increased in volume by the construction of storage tanks near the Ghâts." Is there any such project in exist-occe?—Yss, the Chandkapur Tank.
- 31. Q. Is it in execution now ?-I do not know. It is. a vary large project.
- 32. Q. If you iccreased the supply to the bandharas, would that increase cultivation?—Cortainly.
- 33. Q. (Mr. Ibbetson.)—Government would not got any return?—Certainly they would, Irrigated land near Malegaon is paying as mach as Rs. 15 or 16 per nore.
- 34. Q. The water belongs to the land-owners in the villages and they dispose of it ?—They have an immemorial right, subject to the payment of water-rate.
- 35. Q, How is the irrigation carried out?—If a village's lauds measure 500 acres, perhaps 200 of that could be irrigated. The ideal farmer has a plece of anirrigated land, and a piece in each of the 3 divisions of the tal' or irrigated area. These 3 divisions are coropped in rotation with rice appearance and wheat or gram or other grain. with rice, sugarcane, and wheat or gram or other grain. With rice, sugarance, and wheat or gram or other grain. The villagers manege very well among themselves so as to equalize the profits, for of course very few have land in all the divisions. Anyhow in three years all works out level; if a man has only one field he gets rice one year, sigarcans the next, and grain or pulse the third.
- · 36. Q. Did the people raise any objection to the Chand-kapur Tank?—No, but it was not carried out.
- 37. Q. (Mr. Mair Mackenzie.) Was there any difficulty S7. Q. (Mr. Main Mackenzie.)—Was there any difficulty in carrying on the work during the famine?—Yes, owing to superstition. The people have a tals of a geblin having been killed in the riesr, which is anyposed to make the water bad and the ellmate foverish. The people are very superstitions and when choices broke out were convinced that the geblin was the cause. So they ran away. All the same, if these two reservoirs were constructed, they would an immarsa amount of good. do an immerse amount of good.
- 38. Q. You mean the Chandkapor and Mulher reservoirs P.—Yes, for both are on running streams.
- 39. Q. Are there such perennial streams in Satara district?—Yes. There are many streams near Satara with beautiful sites for bandbaras, where there is rock founda-
- 40. Q. (Mr. Ibbelson.)—l'eronnial streams ?—Yes, e.g., the Krishna in Val taluka, which is perennial except in years of great drought, I could name others, but have not experience of all the streams in the district.
- 41. Q. The water in the channels is very seanty in May and June?—Yes, in most, but some are full all the year round. In others no sagercano is grown as the supply is not certain in the hot weather.
- 42. Q Do you know of any other places where tanks could be made besides Chandkapur and Mulber ?—I know of some sites which seem good. Whother they would really be profitable is a matter for an engineering officer to decide. Mr. Ali Akbar wout through the above two projects with
- 43. Q. You say "I have seen a great many wells and advanced a great deal of money for thom in the Malegnon charge." Can you give figures?—I am afmid not. I had been transferred to Satara when I wrote that.
- 44. Q. You say "Well irrigation is not suitable to the Maratha character" That is what I have found as a general rule. Hundreds of wells were dug in the 1896-97 famine. In 1898 there was a good dry bajri crop. Hence the cultivators, having got caungh to live on without troubling to irrigate, let their wells suit up.
- 45. Q. (Mr. Higham.)-Thoso wore kachcha wells?-Yes.
- 40. Q. Were these wells efficient P-Yes. In 1896-97 there was ample sub-soil water.
- 47. Q. Were they ofterwards abandoned? -Not all, but very many.
- 49. Q. (Mr. Ibbetson.)—Would you expect kachcha wells to be used for long ?—Yes, with care. But as a rule, if there is a good season well irrigation is noglected.

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- Mr. Simcox. 49. Q. Without making them pakks they would not last?

  No, they would fill up in time.
  - 50. Q. (Mr. Muir-Mackensie.)—The expense of making a well pakka is not a smell matter in times of famine?
    —Just so, it is not.
  - 51. Q. What do you think is the cost of a pakka well?

    A small well snoh as they make heresbonts might sverage Rs. 150.
  - 52. Q. In Gujarat it costs from Rs. 750 to Rs. 1,000 P Here they make very small wells, generally for one or two mots only. As n rule they do not use chunam massury axeept for the parapet. In Dahbedi village alone 80 welle were dug during the last famine.
    - 53. Q. In 1899 ?-Yac.
  - 53. Q. In 1899 F—Yac.

    54. Q. (The President.)—What area will each such well irrigate?—As a role from 1 to 2½ acres. But in 1899 the rainfull was very ecanty and the sub-soil water very low. Also so many wells were dug that in parts there was practically a well in every field. The consequence was that the wells failed to Irrigate more than ½ to ½ acre. The complaint was that the soil was so dry that it drank up a greatdeal of water and the whole capacity of a well was needed to keep a very smell area moist.
  - 55. Q. What is the soil of the Malegaon charge? Is it generally black cotton soil?—In the vellsys there is some black cotton soil, but as a rule the soil is shallow and mixed with muram.
  - 56. Q. (Mr. Muir-Mackenzie.)—The irrigation under bendharss is not on black cotton soil ?—As u rule, no. The soil is often very poor stuff. It is very henvily manured Thera ure places where thera is deep black soil, c.g., Kanssi.
  - 57. Q. (The President.)—What about tanks in these talukas?—There are a good many in the Malegaon taluka. They are village tanks
  - 58. Q. (Mr. Ibbelson.)—Not irrigation tanks ?—Nn, not one of them.
  - 59. Q. (The President.)-Thay are small and for drinking purposes only ?-Yes.
  - 60. Q. Are there no irrigation tanks in the charge?—One, a Public Works Department tank.
  - 61. Q. Is it far from eny river !- No, it is on the conrse of one.
  - 62. Q. In Satara district there are a good meny small rivers P—Yes, and they bare rocky beds in places suitable for making bandhatas. I'bo Krisbna is practically a perennial stream, and so are several of its tributaries, on which bandharas might he built.
  - 63. Q. There is no rule, I understand, inforce the people to keep the irrigation in order ?—None, but their own interest.
  - 64. Q. The Irrigation Department bas a clause which compele the villagers to do ordinary repairs?—Tes, but the villagers are not eapable of anything but just keeping the channels in working order. In cases where, as at Saogachangers are not expanse of anything but just keeping the chennels in working order. In cases where, as at Ssogn meshvar in Malegaou taluka, the channel runs along the rive hank, it sometimes gets washed away by floods. The villagers estude to expected to rebuild it. The vil-
  - 65. Q. In avery patasthal village yon have Inamdars connected with irrigation ?—Yes, they are called Patkeris or Havildars and are responsible for the distribution of the
  - 66. Q. Inside their own village limits?—Yes, they are under the orders of the Patil.
  - 67. Q. (Mr. Rajaratna Malr.)—It is entirely a village distribution?—Yes. It involves constant work night and day, for as soon as one field is watered the channel has to be deverted into the next.
  - 68. Q. (Mr. Muir-Mackenzie.)—Ha plaints about unfair distribution ?—No. -Have you had any com-
  - 69. Q. That is, un formal complaints ?-No.
  - 70. Q. Yon have had petitime ?—Yes. The cause of complaint is easily removed. If one Patkari will not work we turn him out and put in nuother.
  - 71. Q. Have yon ever done that ?—Yes. They are subject to the Watan Act. If they do not perform the eservice of their Watan, they are liable to be turned ont.
  - 72. Q. (Mr. Higham.)—You are speaking mainly of bandharas in the north-east pert of Nasik District !—Yes.
  - 73. Q. You say they do not require any storage reservoir?—As a rule they work very well without, but the reservoir would make the anpply more even.

- 74. Q. Dislant villages would get but little benefit from them P-I do not say that.
- 75. Q. The main object of the Chaodkapur Tank would not be to encore the present irrigation P—No, the main object is to fill the Girna Left Bank Canal which would irrigate a dozon new villages, including a little patch of country which has bad no minfall for six years.
- 76. Q. (The President.)—No rain for six years ?—They have not had enough rain to bring bajri to ripeness since 1898.
- 77. Q. (Mr. Higham.)—The Girnacventually flows down to the Jamda Canal ?—Yes.
  - 78. Q. Is the Chandkapur project a big scheme ?-Yes.
- 79. Q. It involves the construction of bandharas at frequent intervals down the river?— Yes, but there is nnly the isitial expense. There is but little recovered expense for establishment.
- 80. Q. (The President.) -The sites eod remsine of some of the old haudharas exist and would be used?—Yee.
  81. Q. (Mr. Higham.)—There are baudharas already working in some parts?—Yes.
- 82. Q. Soppose yon baild a handhara and take water along a shannel, coold you not irrigate more than one village?
  —Yee. I auppose it could be done.
- 83. Q. Could you give un instance of soch a system already working?—No. I do not know of a case.
- 84. Q. If you wanted to take the water further out into the country, your works woold have to be larger ?-Yes.
- 85 Q. (The President.)—What prevests the water going further P-The levels.
- 86. Q. (Mr. Higham.)—I approse the same system abtains on the Mosam ?—Yes.
- 87. Q. What is the length of the channels?-From 1 to
- 88. Q. (Mr. Ibbetson.)—Are there aquedocte in and cases?—Ooly where the Pablic Works Department have huilt them to improve the shannels, e.g., at Kansei and Kalman
- SU. Q. When you speak of 20 or 30 bandharas in 40 miles, how do you distribute the supply ?—Is it enough fur all ?—Yes, as a rule during the last few years the minfall has been extremely scanty and difficulty is being felt.
- 90. Q. Rach bandhara takes as much water os it likes Yes.
- 91. Q. At the bottom of the irrigotion the averflow get back to the river again ?—Yes.
- 92. Q. If there were storage tanks you would get a greater flow ?—Yes, that was Mr. Ali Akbar's idea. He eaid that if the Malber Tank were built the Mosam would be quite safe from failore.
- 93. Q. The echeme was not passed ?—It had not been fully prepared. Mr. Gabagan can tell you whether it has yot been sanctioned or no.
- 94 Q. (Mr. Higham.)—If the tank slways provided water you would be hetter off than at present?—Yes. Among other things the drinking supply of Malegeon town woold be assured.
- 95. Q. If a storge tank existed, would more bandbaras be hull? Not on the Mosam.
- 96. Q. When the supply ran short, how did you settle the dispotss ?—The people generally estiled them among themselves. In one or two cross [there were querrels, but this was the exception.
- 97. Q. I was not rofer ing to distribution within a village, was epeaking of the distribution between your 40 handams. The bandbaras down the stream would get no water in a bad year ?-But they did get it.
- 98. Q. Did they get water in the last had year ?—Yes certain amount. The hest handharas of all is at Nampur about half way down. The river there always runs.
- 99. Q. Do you pot any restrictions on the appar band-haras, or allow them to take what they can get?—They take what they can get
- 100. Q They are not allowed to 'enlarge their cluices?— The elsices are pakka and made end repaired by the Irrigation Department. I do not know what was deep before that Department came into existence. I suppose there was some kackeha arrangement.
  - 101. Q. Thoy take as much water as they can get ?- Yes.

- 102. Q. The Chundkupur Tauk in your opinion should be wurked on an identical system ?—I believe so.
- 103. Q. Under that system the bandhurus down the stream would get an unfailing supply of water ?—Yes, not only so but the Girnu Left Bonk Cunel would be filled.
- only so but the Girnu Left Bonk Cunol would be filled.

  104. Q. Why did Mr. Ali Akbur propose this canul instead of a succession of more bundhares?—Bandharas to pay chunld be capable of being built cheeply. There are tew suitable sites un the Girna, which is a broad stream with steep banks and soudy bettom. Bondharas can only be built cheaply where there is a rock foundation. But Mr. Ali Akbur proposed not unly to make the caual, but to extend arrigotion under each of the existing bundharas. As to the Mulher scheme, that is to encure the flow of the Musam, which is not so safe as the Girna. While it does not run quito dry, still the supply is often too little for sugarcans crops, and the assessment is based un u rotation including sogarcane.
- 105. Q. Yuu would intercept the streem by hendharas nt every village and still have enough water?—I speak of Mr. Ali Akbar's schome us I found it.
- 106. Q. (The President.)—You think it a good one?—Yes.
- 107. Q. (Mr. Higham.)—You think small canuls are preferable to lurge?—I think they are worked cheaper. Without going intu details, I believe that in the Decean the working expenses of a lurge canal generally cat up ull the profits.
- 108. Q. Wuuld not those people make bandharas themselves ?—It is a matter of probibitive expense to them. A small bandhura is estimuted to cost at least Re. 5,000.
- 109. Q. If you get this Girna canal, I suppose you will have to introduce a water-rate ?- Cortainly.
- 110. Q. On the present baudhoras you have wet assessment P-Yes.
- 111. Q. It depends on the area irrigated P-No. it is a permanent acreage assessment on the area irrigated which does not vary.
- 112. Q. You caleglate that u bandhara will irrigate so many acres P—No, the area has already been fixed by oustom. The lend is assessed at a dry rate to which is added a wet-rate according to the crops to be grown, and the two lumped together are the assessment.
- 113. Q. It does not fluotunlo?—Not in the permanent irrigation. In the cose of smell streams of uncertain flow, where water is only occasionally taken, there is a fluotuating rate called pankasar.
  - 114. Q. This ussessment is paid nunually ?-Yes.
- 115. Q. Whatover the area irrigated f-Yes, but in practice the full area is always irrigated.
- 116. Q. If they take more water than they want, what happens ?—It flows back to the rivor.
- 117. Q. Do they never use the aversum to surreptitleusly irrigate extra land?—Sometimes, but the people below seen find it out by the short flow, and stop it.
- 118. Q. As a motter of fact, little extra irrigation takes place? Very little.
- 119. Q. If the Chandkapur scheme is carried aut and you increase the irrigation, how will the land he assessed P—Presumably un the old lines. There will be a little friction at first. I have talked the metter over with villagers, whu protested that there would never be enough water to go round.
- .120. Q. Are people easer to get irrigated land?—They take it greedily. I used continually to be bethered with applications from cultivators below the existing irrigation asking for permission to irrigate. I used to refuse, for the people on the next bradhard below would be certain to raise quarrels, and even if there were enough water, would make out that they were being defrauded.
- 121. Q. If you had a storage reservoir?—Then I would give permission freely, and objections would seen ocase.
- 123. Q. Wuuld the people consent tu wet assessment?—Why not? It is the system they know.
- 123. Q. You have a system of village distribution?—
- 124. Q. Of which the village headmon is the controlling power !- Yes, the Patil.
- 125. Q. Supposing the Palit tries to get more than his shure?—He has his fixed chare, he can get no more.
- 120. Q. He cunnet get more than his share of irrigation, but could be not get more than his share of water?—1 should think perhaps sometimes.

- 127. Q. Have you had complaints of that sort?—Never Mr. Simeox.
- 128. Q. How is the distribution dens?—By the Huvil- 14 Dec. 01. dar ur Patkari.
- 129. Q. Does he attend the field to give enough water und then shut it uff?—Yss.
- 130. Q. Is there a regular time fixed f -No. When one field is irrigated he goes on to the next. He is not allowed to irrigate half a field and then go on.
- 131. Q. They trust his discretion as to when the water is to be terned uff P—The cultivator is generally present, ued it is done by experience. I think the system is a very fair one.
- 182. Q. Is there any royalty cherge fur water ?—Yes, for uccasional irrigation, according to the amount of land irrigated. The Mamlatdar sends out u man to assess it.
- 138. Q. Under what nutherity ?-The Land Revenue Code.
- 131 Q. Under the Land Revenue Code one you charge a rayalty ?—Yes; all running water is the property of Government. All heds of streams are also the property of Government.
- 136. Q. If a man takes water you charge him royalty?
  —Yos. It is called pankasar or water-rute.
- 136. Q. It is not a charge for water but fur increesed produce!—No. It is not for increesed produce, but for rrigation per acre.
- 197. Q. The water is the property of Government?-
- 138. Q. (The President.)—The mun is charged by the number of acres he irrigates?—Yes, at so much per acre.
- 139. Q. The assessment is for the udvantage of getting the weter?—Yes.
- 140. Q. (Mr. Higham.)—Is there a fixed scale of rates?—Yes.
  - 141. Q. It is not uniform P-No.
- 142. Q. [Mr. Jbbetson.]—Does it vary according to the locality or erop?—According to both.
- 143. Q. (Mr. Higham.)—Has the Irrigation Officer the right to close part of the irrigation under a bandhara P—No.
- 144. Q. Supposing the people quarrol, or take more than their shere?—There ere cases where urders are issued that u certain channel shall be closed for a number of deys in a week for the benefit of the next obannel below. These orders are based on old onstom, e.g., the Yuduer bandhara is allowed to take water for five days in the week, and for twu days it has to let the water run down to the Khaknudi bandhara.
- 165. Q. Are such orders disregarded in uny case ? -- Frequently, but I have generally been able to patch up the disputes, but few went to the Collector.
- 146. Q. Supposing they disoboyed your urders, could you shut uff the water ?—I don't know whether I chould have logel authority to do so.
  - 147. Q. You have never done so !-No.
- 148. Q. (Mr. Ibbetson.)—Have you outhority under the Land Revenue Code to settle disputes ubout the distribution of water between the different chunnels?—I don't know, we always managed it by friendly arrangement.
- 149. Q. You really settled such disputes by your influouce P-Yes.
- 150. Q. Huve you may legal authority to settle such disputes f—None that I know of.
- 151. Q. You were not able to settle them because you had certain powers, but because you had influence ever the people?—Yes.
- 152. Q. You suy the people are reasonable and therefore the system works well here abouts ?—Yes.
  - 153. Q. You propose to extend it to Sutara P-Yes.
- 154. Q. De you think the people of Satara will take tu it P-I coold not ear.
- 155. Q. (Mr. Muir-Mackenzie.)—I think there is some hope. The people in Javh taluku and down the Youa River are irrigating in this way?—Yee, on a very small scale.
- 15C. Q. (Mr. Ibbetson.)—In fugerat we were told that it is hopeless altogether to get the people to combine to clear unt small tonks. Is that the case in Setura?—I should think probably it would be the case if un attempt were made.

- Mr. Simcox. 167. Q. Do you think that there should be legislation in order to give the Collector or other Revenue officer authority 14 Dec 01. to settlo disputes and onforce the responsibility of silt olearance, etc.?—It might have to be done if the irrigation is much extended. It is not now necessary in this part of the country. I do not know how things would work in States.
  - 158. Q. Wers those bandharas made by the people themselves?—No body knows who made thom, they are very old.
  - 159. Q. In extending the system to Saturn, do you propose that the people themselves should make them?—I do not think so.
    - 160. Q. Will Government have to make them ?-Yes.
  - 161. Q. Looking at it purely as a commercial matter, do you think it would pay Government?—I believe it would.
  - 162. Q. The area irrigated would more than pay the interest on the cost?—Yes.
  - 163. Q. Would there be no working expecses?—Hardly uny. I do not think the district would need a separate irrigation establishment, the Executive Engineer would probably be able to work the system.
  - 164. Q. You say that in 1896 irrigation from bandharas was reduced Do you know in what proportion?—In 1896 I should say it was rather increased than decreased. In 1898 it may have been diminished by 25 per cent., so that only 3 of the normal area would be irrigated.
  - 165. Q. Not more ?-1 have no figures, but I should not think so.
  - 166. Q. (Mr. Muir-Mackenzie.)—Do the people in a famino year not change the choracter of their cultivation and grow fodder crops?—They do grow fodder in the hot weather, mostly konde a kind of juari. The hot weather orop is usually sugarcano, but that needs a grent deal of water more than is available in bad years.
  - 167. Q. Do they also grow rice, wheat, and gram?—Yes, in and after the rains
  - 168. Q. Do the Satara people appear to take any interest in the bandhure system ?— I was speaking only a day or two ago to an influential resident of Satara, who is now a candidats for the Legislative Conacil. He enggested that bandharas should be huilt on a co-operative system, and wondered whether, if private persons subscribed part of the capital, Government would produce the rest.
  - 169. Q. (The President.)—Is he a man of means ?—Yes, he is the leader of the local Bar, and it was evident to ms that he only spoke after discussing the subject with others.
  - 170. Q. (Mr. Ibbetson.)—In that case Government would only take a royalty on the water ?—No, system has been elaborated. I only mention the matter to shew that intelligent untives are taking an interest in the matter which apparently emounts even to a readiness to invest their money.
  - 171. Q. You say you have small tunks in the Malegaon charge for drinking, why should there not he larger tanks ?—There is one lorge Public Works Department tank on the Puscul River in the charge. It ran dry when it was most wanted in 1899, and no irrigation from it was possible,
  - 172. Q. If you have plenty of drinking tanks, why should you not have plenty of irrigation tanks?—There are one sites good enough.
  - 173. Q. There are sites for the one and not for the other?—Yes. The villoge tanks are made by damming up insignificant nollahs, and soon run dry.
  - 174. Q. Could rice be grown under them in the cold weather !-I think not.
  - 175. Q. It has never been tried?—No. In the case of the Dapurn Tank near the Khondesh frontier, which Mr. Ali Akbar and I saw, he agreed that ofter extonsive repairs and improvements it might be possible to irrigate a few sorces.
  - 176. Q. Is there any system of causes by which such tanks might be made assful?—No.
  - 177. Q. Were one possible, it would have been brought into use?—Probably.
  - 178. Q. You never suggested such a thing?—No. The country is all rocky moreloud or upland with very scauty rainfull. The village tanks are neefal for drinking and for getting a little head of water for wells below.

- 170. Q. There are wells then ?- Yes.
- 180. Q. What hoppened in the famins year?—Most of them dried up. There was not enough rain to fill the tanks, which dried earlier then usual. There were cases where whose villages emigrated on account of want of drinking water.
- 181. Q. (Mr. Rajaratna Mdlr.).-Cnu you tell us the urea these baudharas irrigute in each district or taluko ?—It varies much according to the soil, flow of water, and level of the land.
- 182. Q. What is your present area of irrigation? -I have no figures.
- 183. Q. When you were in charge, whot was the area irrigated ?- I would not say off-hand.
- 184. Q. Are the baudharas now irrigating n larger area than of old P—I think not. The whole as stem is very old and seems to have been worked to the full capacity of the mater from old times. The people have an instinctive sease of the possibilities of irrigation. I do not think they could irrigate more than they do. The instinct has become boreditary through many generations. They are elever oulties tors and their load is well farmed.
- 185. Q. If asw haadharas were built elsewhere, do you think the people would not combine and co-operate to keep them in repair?—If the system were to he tried in a new part of the country where it is not nadorstood, I should prefer that one or two bandhoms be made first as experiments, to see if the system would work.
- 186. Q. Would you substitute a small coss in lieu of a contribution for labour for potty repairs?—I could not say. A free hand as to details ought to be given in trying the system, or it ought not to be tried at all.
- 187. Q. Beferring to the Chandkapur scheme, would its construction interfere with existing bandharas?—Quite the reverse.
- 183. Q. The higher the water level, the further exten-
- 189. Q. (Mr. Muir-Maekenzie.)—I think Mr. Rajnratan asked you whether it would be preferable to substitute a small cess for a contribution for labour. Do you approve of such ucess in the existing bandhuras?—Nu, the present system is working well.
- 190. Q. (Mr. Rajaratna Mdlr.)—You cannot give the figures of revenue from existing bandlmas?—Not now. I could find them out, or Mr. Gabngau could give them.
- 191. Q. (Alr. Muir-Mackenzie.)—Do you consider that the present system of assessment by consolidated rate works on the whole satisfactorily ?—Yee.
- on the whole satisfactority r—1ee.

  192. Q. You would not like to eeo a orop-rate substituted?—No. The present system is good for people who pull together as these do. For instance, one man's land will be under sugarcane, which pays the best, a second's under rice, which pays moderately, and a third's under grum or wheat, which pays the least, necording to the rotation. Yet their circumstances seem all nike, and no doubt they have some system of pooling profits.
- 193. Q. (The President.)—Do they take equal shares.— They come to some friendly armngement.
- 194. Q. (Muir-Mackenzie.)—Do they lump all the oultivation together?—I should not go as for as that. These arrangements are never made public.
- 195. Q. (Mr. Higham.)—What is the proportion of dry land cultivated to irrigation !—Ten bighes of dry land to one of irrigation is supposed to be the ideal proportion—not often attained.
- 193. Q. (Mr. Muir-Mackenzic.)—Does rice pay as well as sugareane?—Not so well, but it is a paying crop.
- 197. Q. Do you know how the relative valoes are calculoted of the two for the purpose of assessing the rate. Is it half rate for rise, whole rate for sugarcane?—I do not know the exact proportion.
- 198. Q. Would it be 16 to 6?—I should think 16 to 10. Bagian rice is of very good quelity, I always used to get it sent to Satarn.
- 199. Q. What happons to the surplus water from bandhuras?—Down the nearest unliah to the river again. The people of Bagder, for instance, who live near such a nallah below the irrigation of Bej in Kolvan tsluka wish to dam this nallah and thereby establish a channel of their own.
- 200. Q. Is there subterraneous percolation below the limits of the irrigation ?- I believe usually.

- 201. Q. Were any wolls dag in such laud daring the famino?—Yes, several.
- 202. Q. Were they successful?—I helieve so. I know onto were so near the Satara irrigation.
- 203. Q. Do you think such sites for wells were chosen purposely P-No doubt.
- 204. Q. The multiplication of bandharas would then not only be useful for irrigation, but to keep up the level of the subsoil water ?—Yes.
- 205. Q. You were saying that some of the land irrigated is black soil?—The deepest black soil is at Kacasi.
- 200. Q. Coald you tell us how deep the soil actually is nd when muram is resched f—It is at least 6 feet deep, robably more. I have never seen it dug up doeper than 6 foot.
- 207. Q. Is it absolutely pitch black?—Yes, it is a rich soil. The minfall there is too heavy for cetton to be grown, but I imagine the soil is like the black cotton soil of Guiarat.
- 203. Q. Does black cotton soil require a great deal of water ?—I have not heard of its needing more than any other.
- 299. Q. What is the land at Satara ?—Black soil nearly 6 feet deep with muram at the bottom.
- 210. Q. We have been told that black cotton soil is unsuited for i.rigation P.-Such is not my experience.
- 211. Q. Do not people complain of the "sickness" of black cotton soil?—No. In Kaussi whore the soil is deepest, there has been no real trial. I montioued above that the village was only just being repopulated.
- 212. Q. You distributed a large amount of takavi in 1899-1900 ?—Yes.
- 213. Q. A groat deal of the distribution was done with your own hands f-1t was all done by my obeques.
- 214. Q. Were you impressed with the efficiency of the arrangement by which Assistant Collectors distributed taken personally?—Do you think it made the people mero ready to take advances?—I do not know. My reason for personal distribution was that one Mamlatdar works quicker than another. The quickest man, if left to himself, would get an unfall proportion of the grant for his taluka.
- 215 Q. Do you think that Assistant Collectors would have time for personal distribution in ordinary, times ?—Certainly, because then the demand is not large. In famine times it is right hard work. For instance, on one day at Malegaon I had between 1,000 and 1,200 persons present taken prititions to me.
- 216. Q. What is the cost of digging a well in the Malegaon charge?—For a well dug and built complete, I should say about Rs. 250 on an average.
- 217. Q. (Mr. Ibbetson)—Allowing for what depth of water in the well?—Ahout 8 feet.
- 218. Q. And the total depth of the well?-Ahout 30 or 40 feet.
- 219. Q. You include the building of the well?—Certainly-
- , 220. Q. (Mr. Muir-Mackenzie)—Did the building of wells during the famine lead to a larger area being irrigated ?—In 1896, yes—in 1899, ao, as the water was so low.
- 221. Q. Why so?—In 1896, though the rainfall was not timely, we had maore than the average.
- 222. Q. What is usually grown?-Wheat, gram, vegetables and fodder crops.

- 223. Q. Are the people keen about takavi ?—There is little Mr. Simeox. demand in Satara district, Lately, in the cold weather, I have been having a petition about once a week. This being the lit Dec. 01. well digging season, if there were any resl demand there would be hundreds of petitions.
- 224 Q. Do you think any alteration of the system will bring about any improvement !- No.
- 225. Q. It is no use lowering the interest? People do not mind the interest, they only object to the rigidity of the collection of instalments.
- 228. Q. Would it stimulate extension of takavi in ordinary times if the collection of instalments were made more clastic?—I don't think so.
- 227. Q. You do not think that would make them dig more wells?—No. If they want to dig wells in ordinary times they go to the Savkar.
- 228. Q. Doyou mean to say that if Government increase the facilities for getting mansy, the people cannot be induced to dig more wolls?—There is no harm in trying but I think not.
- 229. Q. (Mr. Ibbetson)—Is terracing done in your charge?—In Satara there are a great many terraces.
- k 230. Q. Do you think famine labour could be profitably employed on terracing ?—I had not thought of it, I should say famine labour might be so employed in hilly country.
- 231. Q. (The President)—You say that near Malegaon each village has its own bandhara?—Yes.
- 232. Q. Is there any village with two bandharas?— Very few. For iastance, at Arai there are two, one worked by Government and one by an landar. The water suffices for both.
- 233. Q. Is my bandhara the joint property of two villages ?-Very few.
- 234. Q. If a dispute open in a village, to whom do the disputants apply ?—I know of no rule. In one case they telegraphed to the Co.lector of Nasik.
- 235. Q. Does any appeal lie to the High Court ?-I could not say.
- 236. Q. (Mr. Ibbetson)—Could you tell us anything about the liability of the Satara district to famine and searoity?—About 60 miles from the Glats the land is very rocky and subject to drought. The taluka of Man is very subject to famine. But in the Glate near Mahabaleshwar there is always ample rainfall. The central part of the district is only partially subject to famine, if at all
- 237. Q. When you say the eastern part is subject to famine, you refer to the country hordering on Shelapar and Bijapur?—Yes.
- 238. Q. Doss that cover a considerable area ?-Yes, quite one-third of the district.
- 289. Q. The other two-thirds is secure?—Yes. A large portion user the Ghats ie taken up with forest.
- 240. Q. For bandhara irrigation you prefer a consolidated to n crop-rate P-Yes.
- 241. Q. You consider the former more advantageous ?—Yes.
- 242. Q. Why?—It is what the people are accustomed to, and they are always ready to pay it.
- 243. Q. If we made new bandharas, would there be some disappointment if we introduced a water assessment?—Yes. The people are thoroughly conservative, and would certainly raise quarrels over any new system for the first few years.

WITNESS NO. 42.-MR. E. G. GARAGAN, Executive Engineor, Khandesh Irrigation.

Answers to printed questions.

#### A .- GENEBAL.

- 1. The roplies refor to the Khandesh Irrigation District, of which district the writer has been in charge rather less than twelve mouths, during which time he has seen little of a large district, as he has had a very short tenring time, and his opportunities have unfortunitely not been such as to make him thereaghly acquainted with it in a short time.
  - 2. See Appendix I.
- 3. (1) Yes, in places, e.g., in the Upper Panjhra Subdivision the population by the last consus is about 50,000 and the area of culturable ground near £00,000 acres.
- (2) No.
- (8) No.
- (4) No. There is black cotton soil in a great many places, but on the whole the soil is very good.
- (5) No. Just lately the unfavourable mensores have had some effect, but ordinarily there is no reason why the quantity of water should be considered to be insufficient and tell against extension of irrigation.
- (6) No. The people are keen on irrigation and can generally find the capital necessary.
- (7) I have not very much knowledge of this, which is a question for the Revenuo Department, but from what I

Mr. Guhagan.

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Mr. Gahagan. 14 Dsc. 01. can gather in sovoral parts given a certain sapply of water, the people (generally speaking) would not mind even a slight enhancement of assessment.

- (9) Thore is a chance if irrigation were increased that the price of labour would rise, this though is hardly a reason against extension of irrigation although it would increase the expenditure of the agriculturists.
- 5. Loans are not, as for as I am aware, taken for extension of irrigation from canals, but are freely taken (if the applicant een give the required security) for the perpess of well digging or deepening so as to extend cultivation under this form of irrigation.
- (4) If 1 thore is a failure to get water, there should be, I think, a total romission of the advance, but I would suggest Government using drilling or boring machinery to n far greater extent than at present to try and make sure of whother water is obtainable or not before actual well digging is attompted.
- 6. I should think not, md have never heard of such having happened. In this district there is a very strong desire, and a very general desire for extension of irrigation. The people are naturally agriculturists, and are very anxious for an increase.

#### B .- Canals of continuous flore.

- 7. (1) The system of irrigation in this district is the "Thal" system, that is, the whole "Thal" or "rallage land under cultivation" is divided into four "Phadis," each of which is cultivated in rotation with a different crop, e.g., one Phad has sugareane one yeer, the next has rice, the third wheat and the fourth, say, bajri, till and other crops. Next year the one that had sugareane will have rice, the rice plet will have wheat, and so on. Each of the sugarcane, wheat and rice crops can only give one harvest n year, but the fourth "Phad" gives two harvests yearly. So one-fourth the leud always gives two harvests.
- (2) The increase in the value of the crops is very considerable, as the value of crops grown is very much greater than it would be otherwise. If the more valuable crops, e.g., segarcane, wheat and rice were not grown, two harve-ts could be had in each Phad every year. This, however, would not pay so well.
- (3) (a) In a year of good rainfall rice and sugarcano would not give the same yield without causal water, as with, in fact, it is doubtful whether they would come to anything at all. Wheat and the other crops would probably be as well off in a good year without the canal as with it.
- (b) In a year of scanty rainfall the yield is considerably inorcased,
  - (c) The same, only more so.
- 8. A statement showing the comperison of net profit from the crops grown in an unirrigated field and nu irrigated field of one acre in area is attached. The yield of the former is given for one year only; and the yield of the latter for four years is taken into account, and an average for a year is struck. This shows that an irrigated field prodoces crops of the average value of Rs. 65, at an expense of Rs. 28, leaving the net profit of Rs. 65, at an expense of Rs. 28, leaving a net profit of Rs. 14 only. In ordinary years, therefore, an irrigated field of one acre pays three times the income of an universated field of one acre pays three times the income of an irrigated plot would give no yield whatever, whereas the cultivation of an irrigated plot would profit the owner at least Rs. 22, if not more. There is, how-

over, no reason why the value should not be more owing to the high prices of grain which then provail.

#### D .- Tanks.

23 to 33. It is prosumed from the questions under this head that small tanks, such as village tanks, otc., are meent. None of these exists io this district, so I can say nothing on these questions.

#### E .- Wells.

34. See Appendix II.

- 35. (1) Wells allow of two harvests being grown instead of one, one by moneoon and one by irrigation from the wells. This, of course, is provided, none of the high valued crops are grown, e.g., sugarcane and rice.
- (2) In this district higher rated orops are not grown under wells.
- (8) (a) In n year of ample rainfall wells are hardly if ever used.
- (b) In a year of scanty rainfall wells me very useful for supplementing irrigation from canals when canal water is short, and for sopplementing monsoon water by helping to water Jirayat crops.
- (c) In a year of drought if they have water (which they generally have, as they do not run dry till the next year), they are very usoful.
- 38. (1) Serious difficulty in selecting n spot for a well is not as a rule encountered in this district. The people consult their neighbours, and take into account the general nature of the surroundings, and are generally successful. They rarely if ever now call in the assistance of "water divinors," though I have known cases in which the aid of the latter was called in with very poor results for the man who paid.
- (2) In the actual construction of the well there is no difficulty.
- As far as I know no assistance has been offered by Government or Lecal Bodies in the shape of advice or use of boring tools, etc., in this district, although it has in others and I have myself tried them. I would strongly recommend the further use of boring tools which should be supervised by experienced men, and a small charge made when a spot with water was found.
- 30, I do not think Government should build wolls in private property. The people are just as well able to do it for themselves, and as they would not have the heavy establishment charges to incur which in Government work so udds to the cost, they would get it done cheaper. Their work would not have the finish that Government moght to advance the money, after finding a spot by boring, mid then let the owner work the rest in his own way. In addition, if Government built the wells, they would want some return either in a lump sum or as a yearly rental, and the cultivators would not care to be bound down to anything like this, as they could never be certain of a supply of water, nor of the means of lifting it as they are never very vertain of what their couldition will be in future years, nor whether they would even require the water, if the resinful should be exceptionally good.
- 40. Temporary wells are very rarely used in this district, nor does it appear necessary to one our ago their construction. I have little knowledge of them myself, but from information gathered from many sources this is what I learn.

# MINUTES OF EVIDENCE.

APPENDIX I.

Statement showing the average Rainfall in each month as gauged at the following Stations.

Alr. Gahagun, 14 Deo. 01.

	STATIONS.																					
Months.	10	gation lice at legaon	1 111	akti auk.	Ja	mda.	Mb	abwa.	Ha	tala.	[ .1	arsul ank irana).		akri.	Da	hival.	A	mli.	Pan	kheda.	Lal	chala.
-	Ic.	conts.	In.	conts.	In.	cents.	In.	cents.	In.	conts.	In.	couts.	In.	cents.	In.	cents.	In.	cents.	In.	cents.	In, e	enta;
January .	0	1	٥	5	0	15	0	18	٥	82		•••	٥	5	٥	2	0	16	٥	10	٥	19
February .	0	2	0	2	0	25	0	12	٥	6	0	2	٥	3	Ì	•••		•••		•••		•••
March .	0	9	0	6	0	8	0	9	٥	18	٥	1	٥	1		***	}	4++		***		•••
April	o	9		10.	0	12		•••	٥	5	٥	٠ 1	0	G		•••		•••	Ì	•••		***
May .	0	69	۵	4	0	23	٥	36	٥	74	٥	42	9	65	0	8	٥	4	0	10	0	3
inne.	3	51	3	51	4	57	4	91	3	82	4	49	5	40	5	2	5	87	6	9	8	27
July .	4	60	6	11	5	67	7	50	7	61	4	63	5	6	7	91	12	2	9	77	20	97
Angust .	3	51	3	81	5	23	6	69	6.	2	1	99	8	18	5	52	9	56	7	57	12	56
September	6	99	5	73	7	45	5	81	6	63	6	63	4	1	3	<b>E2</b>	5	11	4	52	7	63
October	1	19	0	45	٥	63	0	90	1	38	1	1	1	55	1	88	9	57	2	19	1	83
November	0	24	0	27	٥	27	0	14	0	7	0	27	10	41	0	72	٥	84	0	95	0	96
December	٥	2	0	1	٥	4	0	7	0	9	٥	6	0	2	_		_	,,,		•••		<b></b>
TOTAL .	20	96	20	6.	21	60	26	83	27	31	19	54	20	43	24	70	42	91	31	29	52	43

### APPENDIX II.

### E.-Wells.

• [	Upper Panjhra.	Shabada Sub-dirislov.	Dhulia.	Jamda Canals.	Malegaon.
31. (1) Average depth of wells.	20' to 30'	80'	80'	40' to 50'	25' to 30'
(2) Naturo of supply .	Percolation .	Porcolation .	Porcolation .	Porcolation .	Percolation.
(a)	Do not fail in ordinary year.	Do not fail in good years.	De not fail .	Do not fail .	Do not fail in good years.
· . · (0)	Fail in years of drought some- timos, but generally the year after.	Some fail in years of drought.	Somo fail in bad years, most year a fter tho drought.	Yes, some fail .	Some fail in years of drought.
(8) Averago cost	Coat from Rs. 150 to Rs. 250.	Rs. 300 to Rs. 400.	Rs. 150 to Rs. 250	Rs. 100 to Rs. 150.	Kachoba wells Rs. 50 to Rs. 70, Pakka wells Rs. 150 to Rs. 200.
(4) Average duration .	Pakka built said to be 100 years.	Pakka abont 100 yoars.	100 years	100 years .	Kacheha wells las for 5 years, Pakk
(5) Manner of lifting water.	Lifted by mots .	Mots	Mots .	Mota	100 years. Mots.
(U) Averago area com- manded.	15 to 20 acres commanded.	16 acres	15 acres . :	12 aores	15 nores.
(7) Average area irri- gated in any one year.	3 to 5 acres	9½ ,,	2'4 ,	4 "	6 "
Annual cost of repairs.	Rs. 5-10	25 to 30	Rs. 3 per year .	Rs. 10, including repairs to mots, etc.	Rs. 5 to Rs. 10.

Mr. Gahagan. Statement showing the estimate of the increase in value of the produce in an acre of irrigated Thal land over that in unirrigated one,

		-
14	Dec.	01
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	ď	leop.	Gross w	alve ( Sed in		Expens As R	er, incli Eolede 1					
Yead.	Kharif.	Rabi.	Etarif.	Rabi.	Total.	Govern- ment assess- ment.	Manuro.	Sood.	Wood- ing.	Press- ing charges.	Total.	Net Profit,
							Bagayat	crop esti	mate.			,
Ist year .	Bajri cr tili		18	17	85	8		3	2		13	23
2nd , .	Rico	ber.	35	<b></b>	85	8	***	3	2	) ·	13	22
3rd " .	Sugarcano	***	150		150	8	20	12	10	25	75	73
4th " .	,,,,	Wheat, single crop.	40		40	8		3	2		13	27
			243	17	260	32	20	21	16	25	114	145
Averago per jeat.		***			53		***		`	***	28-3	36-8
					Jiraz	al crop e	elimate	in irriga	ted Thai	land.		
Every year .	Bajrl or till		16		13	1	***	1-8	1-8		4	14

Statement showing works executed by Relief Labour in the Khandesh Irrigation District as per paragraph 9 of the Irrigation Commission Notes.

		Expans	oprae,	
Berial Number.	Rame of Work,	On each work.	Oo each closs of work,	Remares,
	I.—Roads.			
1 2	Provincial. Improving the Gharda-Kondalbari Road Constructing a road from 52 miles on the Dhulia- Surat Road to Visarwadi.	46,374 11,715		
3 4	Local. Constructing Shahada Taloda Road Do. a road from Visarwadi to Chinchapada Railway Station.	32,760 39,767	1,50,636	
	II ROAD METALLING.			The works having been trans- ferred to the Executive
5	Provincial. Metal Collection, Dhulia-Eurat Road	80,431		Engineer, Khandesh Dir- trict, this expenditure has been adjusted with that' officer.
6 7 8 9	Local.  Metal Collection, Dhondiacha-Shahada Road  Do. Songir-Nandurbar Road  100. Talada-Nandurbar Road  Do. Salri-Finpalner Road	15,512 \$7,053 31,257 7,793	2,34,126	
	Indication Works.	•		
10 11 12 18 14 15	Imperial.  Constructing Chankapur Tank Do. Purmapada Tank Do. Taiwada Tank Do. Roipur Tank Silt clearance, Jamda Canals No. of Irrigation Channel on the Kan	43,576 2,06,135 1,00,826 48,217 23,727 1,070		
	OTHER WATER STORAGE WORKS.			
16 17	Municipal Works. Improvements to water-supply at Jalgaon Constructing Undhala Tank	74,951 25,101	6,23,0P2	

- 1. Q. (The President)—You are Executive Engineer of the Khandesh Division P.—Yes.
- 2. Q. You are in charge of the district of Khandesh ?— Yes, of Khandesh, and Bagha Division of the Nasik district. There are four taluks in my charge.
- 3. Q. I suppose your chief irrigotion works are ban-dharas ?-Yes.
- 4. Q. How long hove you been in this Division?-Not quite 12 menths.
- 5. Q. Where were you before !- I was in the Secretariat in Bombay; before that I was in Satara.
- 6. Q. (Mr. Mnir-Mackenzic)—Were you not in Nasik?
  —Yes; I was there five years age. I was in Satara for o couple of years before I come hero.
- 7. Q. (The President)—How long were you in Nasik?—About two years, but I did not see much of the district; I was on the Godavery Bridge.
- 8. Q. Do you know of any sites for tanks in the Khaudesh district?—Yes, I reported on a site and recommended that a tank ought to be built as seen as possible.
- P. Q. How far is the Public Works Department responsible for the repair of bandharas?—Only when they get into a very bad state, and become practically useless, we then prepare the estimates and do what is necessary.
- 10. Q. What is done in the case of petty repairs ?- The villagers look after that. They generally let them get pretty bad before repairing them.
- 11. Q. You have no separate establishment to supervise the work?—No, our establishment has a tremendens lot to do and cannot see to everything, and when our attention is called to the want of repairs we attend to them at once.
- 12. Q. Do you visit the bandharas periodically?—I have not visited all, but in the short time I have been here, I have inspected a large number.
- 13. Q. I suppose if you notice anything wrong you call upon the people to make the accessary repairs?—Yes; if anything wants putting right or needs clearing I call upon them to do it.
- 14. Q. They are responsible for such repairs, but do they generally carry them out f-Ves; they have done so up to the present.
- 15. Q. Here you never heard of them refusing to do it?—I have heard they neglect to do so semetimes, but that is not my experience.
- 16. Q. Generally speaking, as far as your experience goes, do you think that the system works very well?—Yes, very well indeed.
- 17. Q. As to the distribution of water, how does your system work?—In a bad year it does not work well; the rillagers economize water in their own villages.
- 18. Q. In ordinory years, about whot proportion of the whole land is irrigated? Is half irrigated?—I should think so.
- 10. Q. In a bad year when weter is scarce, presumably prices are high?—Yes.
- 20. Q. Would the villagers in such times not cultivate more extensively by ploughing up the fallow hands?—I have never seen them do it.
- 21. Q. With the inducement of obtaining higher prices for their predoce would they not extend Irrigation?—No; because they are not sure that there will be sufficient water to extend their irrigation. If they were perfectly certain that there wend be a good supply of water, they would extend it.
- 22. Q. They would not risk it !-- No; they are very keen but cautious.
- 23. Q. The wasto water goes back into the river ?—Yes. The overflow goes back to the river and is taken up further down by another bandhara.
- 24. Q. What do you think ought to be done to stop the people from wasting water?—I sheald propose that the Land Rovenae Dopartment should have legal authority to control the water-supply. For instance, in a year of drought, we cannot stop the water when we like. If people choose to toke water we cannot prevent them.
- 25. Q. (Mr. Mair-Mackensie)—I suppose you do prevent them?—There is no law to support us in doing so. If the people in a village are obstroperous we cannot cut off the river supply. The Irrigation Act and the Canal Act do not apply to the second class irrigation works.

- 26. Q. What are second class irrigation works?—These that pay consolidated revenue.
- 27. Q. (The President) —Suppose you say to the villagers "you will get water for se many acres; you shall not have any mero," would they question your legal power?—No; they would agree.
- 23. Q. You told us this merning about eight of your bandharas. Is there ony water left in them ofter the monsoons?—Yes; in ordinary times when the river flows.
- 20. Q. The Makti tank reservoir is new dry?—Yes entirely; the river supply has failed practically; we have no water-supply in the river.
- 30. Q. You have practically only tank irrigotion new? Yes, the Panjhra fails, but the Girna goes on always.
  - 31. Q. Does the tank take canol water only ?-Yes.
  - 32. Q. And the Panjhra? -No.
- 33. Q. How long has the tonk been in existence?—For the last 20 years I think, but I den't knew exactly how long.
- 34. Q. Is the Mukti a large tank?-No, it is rather a small tank.
- 35. Q. How long does the water last?-With a little economy the water lasts till the next mensoon.
- 36. Q. (Mr. Muir-Mackenzie)—Was it not etated in correspondence that the Executive Engiager had power to control the water supply?—No; we cannot stop the river water supply.
- 37. Q. (The President)—Have you seen these eight bandharas?—No; I have seen only three of them.
- SS. Q. De you know the country well enough to say whether if a tank twice or four times the size of the Mukti were huilt it would be possible to extend irrigation ?—Yes, I have been told it would be. We have positions to extend it.
- SO. Q. Do you know anything of the tank projects in the Ghats f-One or two only. There is the Punpara which is about half finished.
- 40. Q. Could your bandhara system he extended to irrigote a greater area t han at present untored?—Yes, if there was a storage reservoir.
- 41. Q. Do you think you would then require a more claberate system of supervision and distribution?—I do not think so; I think the people could manage it fairly well themselves; they manage it now perfectly. There must, however, be some authority which could interfere if they marked the water; etherwise I would suggest that it be jeft to them.
- 42. Q. De yeu think the channels should be enlarged? No; I do not think any villege could extend its irrigation sufficiently to require an enlargement of the channel for the present.
- 43. Q. Bat beyond the vilinges ?—At present we have fon cuble feet of water; I don't think irrigation can be extended two or three times more than it is at present. All the capels really run ulong the village bonk.
- 41. Q. Whot is the area irrigated on this district?—About 12,000 acres and in Nasik about 25,000 acres; that is, under the bandharas. If they are extended I do not know if the present channel would be big enough; but the bandharas would bring more villages ander cultivation.
- 45. Q. The present bandharas and the present channels could be enlarged to enable the water to pass to another village?—I think squabbles would take place if one channel had to serve two villages. It is better to allow o channel for each village.
- 40. Q. It would be mere expensive?—Yes; we should make new consis and carry thom through more than one village.
- 47. Q. You have told us about the Chandkapur tank?—Yes; it is in the aerth-west part of Malegaon.
- 49. Q. You say "the irrigable area is 10,445 acres "?-Yes.
- 49. Q. There is to be a big banthara on the left bank?
  -Yes.
- 50. Q. Has that not been bailt up yot?—No; it is a part of the Chandkapur project.
- 51. Q. I believe that the earthwork of the left bank is finished?—Yes; the canal and the bandhara are finished; but none of the mesonry work has been done.
- 62. Q. Do you know at what stage the project is just now?—It is either before the Government of Bembay or the Government of India. It left my hands long age.

Mr. Gohagon.

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Mr. Gahagan. 14 Dec. 01.

- 58. Q. You say some work was done on it during tho fumine P—Yes; it was storted some thing like 25 years ugo; Rs. 70,000 or Rs. 80,000 were spent on it. The masonry dam could not be done by famine labour.
  - 54. Q. There is to be a masonry dam ?-Yes.
- 55. Q. How high?—About 85 feet; some objections were raised to the height.
- [Mr. Highm explained that the objection raised by the Government of India was as to whother the estimate of revenue likely to accrue was not based on over senguine
- 56. Q. It is an old project?—Yes a very old project which is blocking the way of others. If the tank wore completed we could construct more bandharas.
- 57. Q. Was it on the mean or the minimum minfall that Mr. Tate calculated the project?-On the mean rainfull over several years.
- 58. Q. There is a good Ghat catchment where there is pleuty of water and so there will be no doubt about the tank filling?—No; it will fill.
- 59. Q. What is the most important project in year Division just now?—The Purmapada tank; there are also same athers. The Purmapada is nearly half finished. There is the Munad and also two others which we have condemued because the foundations are too deep.
- 60. Q. Where is the Purmapada tank?-It is about 15 miles from here; it is on the road to Malegaon.
- 61. Q. Are there any baudharas down there f-No. The water will have to be taken 37 miles down river before it starts irrigating. The point is whether the water will go down to that distunce.
- 62. Q. Has the project game to Government for same-on?-It is half finished. The dam is bullt, excepling tion ?the closing gates.
- 63. Q. Why was the work stopped?—It was a famine work which stopped with the famine.
- Gi. Q. It is not being carried on as an ordinary work? -No.
- 65. Q. The estimate is Rs. 2,60,000?-Yes.
- 66. Q. The whole estimate is Rs. 4, 10,600 P-Yes.
- 67. Q. It is an expensive work ?-Yes.
- 63. Q. (Mr. Higham)—The two lakks of famine work done does not represent the value of the whole work done f —No, not by one-third.
- 69. Q. (The President)—Do you consider that the work is one which ought to be completed f—Yes, Government may think it can walt for another famine, but it would take 3 or 4 famines to finish it.
- 70. Q. (Mr. Higham)—When was the work stopped?—No work has been done since last December. The work was stopped last Christmas; there are u let of works like that in this district. The famine stopped and the works slopped.
- 71. Q. The other works I suppose are of no particular since?-No, they were morely taken up to give the people employment.
- 72. Q. Are there any other tanks !- There is the Manad 72. Q. Are there any other trains:—There is the Manau which was designed to supply the Jambeda cannl; that is an important tank; the objection to it is its creat depth; they have gone about 50 feet and they canaat get foundations. This tank is very important as the Jamda canal does not do what it was intended to do. It was constructed to supply water for sugarcanc. The tank is bully wanted and the site selected is the only one possible.
- 73. Q. What about the Dudhala tank?—Nothing has been done to it except that it has been looked at.
- 74. Q. Have you u list of works for which the estimates have been completed ?-I have not get one; perhaps Mr. Beale has.
  - (Mr. Beale)-The list is given in my report.
- 75. Q. (The President)-With this list to fall tack on yen would have no difficulty about a programme of velicit works. You could turn the people out on them at once?—Yea, in my port of the district; I have plenty of projects ready.
- 70. Q. (Mr. Higham) What are the limits of your large? Tho wholo of Khandesh and the Molegnon Division of Nasik.
- 77. Q. You have many bandharas in your district. What is the total uren they irrigate?—About 20,000 acres.
- 78. Q. I don't think the Jamboda canal is included ?-It is not included in the bandhara system; it is a separate

- 79. Q. How many bandharas have you got ?-We have 182 bandharas in both districts.
- 80. Q. How much land does the Jumdu canel irrigate? -It irrigates about 5,000 neres.
  - 81. Q. Have you any other cannis !- No.
- 82. Q. The total irrigation in your Division is about under 50,000 acres ?—About 120,000 acres in all; 37,000 from bandharas; 5,000 from the Jamda canal; and the rest from the large Government tanks.
- 83. Q. They don't feed the bandharas ?- No, they irrigate direct.
- 81. Q. (The President)—The Jamea canal has a band-hara ?—Yes,
- 85. Q. When are you going to finish the tanks?-I don't know.
- 86. Q. Would you keep the Cuenkapur back?—It has not been sauctioned yet.
- 87. Q. Do you know at what slage the project is ?-The project came here nine or ten months ago and was sent back, and we have heard no more about it.
- · 83. Q. Was anything done to it during the last fumine f
  —Very little I believe; I was not here. I think very little
  indeed has been done to it since the 1897 famice.
- SO. Q. What about the Purmupeda?—It was stopped when the famine was over.
- 90. Q. Have you any estimates for repairs?—Yes, they are ready, but have not been sanctioned.
- 91. Q. What about the Raipur?—Practically nothing has been done to it. I have received a petition ugoinst it.
- 92. Q Have you gone into the points of the petilion? No, I only got it yesterday.
- 93. Q. (Mr. Hiokam)—Are there any schemes for building additional bandharas?—There are several. Two are now being made.
- 91. Q. Will you take them up as a second class work?—No. I think they should be taken up as first class works.
- 95. Q. Would you keep a capital account for them?
  -No. They only cost about Rs. 5,000 each.
- 96. Q. Would you charge consolidated ratef-No; but if people ask for it, it will probably be granted.
- 97. Q. Could you make them uithout a storage reservoir?—Yes. We could make them on ulmost every river exe pt the Tuptl, but they would all be the better for storage reservoirs. Those we are now working are on perennial streams and don't want reservoirs. There is room for more of these on the Glana and Mosam.
- PS. Q. You say it would be a great advantage to make borings for wells; is anything like that done?—Not here; I did some in Situra.
- 93. Q. Who did it; the Public Works Department? -Yeu,
- 10). Q. Here you a set of bering tools?-Yes, we have three sets; we lend the machiners to the Manlatdara; they
- 101. Q. How did they work ?- I don't know; I left the district about that time.
- 102. Q. Did you find a good water tsupply?-Yes, in
- one place; that is all the experience I have.

  103. Q. Do the people make applications for the loan of these tools?—I had three or four.
  - 101 Q You charge a nominal rate?-Yes, Rs. 5.
- 105. Q. Did you make any boring for the people and charge them?—No, never; we have not done that for any-
  - 105. Q. In this district it has never been done?-No.
  - 107. Q. Would it be useful?-Yes; it might be useful.
- 108. Q. (Mr. Ibbetson)-You say that 87,000 acres are irrigated; what would be the cost of o-tablishment per acre irrigated; what would be the cost of o-tablishment per acre irrigated from a bandhorn?—I could not say.
- 109. Q. What is the cost of total establishment?-I could not tell: I can get the figures to-morrow.
- 110. Q. You have no new Landharas made which are new worked by Government !- No. . Wo are building two."
- 111. Q. Do you think they will pay?-Certainly.
- 112. Q. There is no doubt about that ?-No."
- 113. Q. On perennial streams !- Yes, or any stream with a reservoir.
- 114. Q. In order to centrel the distribution of water do" you think that legislation is necessary to give you proper

Mr.

power to the Public Works Department or the Revenue Department.

115. Q. Did you have any trouble in getting the psoplo to do their own share of the work?—No.

116. Q. Do you think that legislation is necessary in regard to repairs also ?—I do not think so because I think the present Act covers it.

117. Q. You have power already ?-Yes. .

118. Q. Sapposo you have not?—Then it might be accessary. I think we could make them do that.

119. Q. You say first closs works pay water rates and the second class a consolidated rate?—They are called second class works simply for purposes of accounts.

120. Q. (The President)—Tho new tanks would be first class works?—Yes.

121. Q. The bering tools you have in Satara are for trul borings?-Yes, they are about 3 inches in diameter.

122. Q. You say any tank would be popular?-Yes.

123. Q. There is no irrigation tank in this district P-I am speaking of village tanks.

124. Q. Would they be popular !- There are some which are disused.

125. Q. Do you think there are sites on which small tanks could be constructed?—Yes, last week while out in camp in three days I found two good sites.

128. Q. Do you think there are plouty of sites?—Yes; as a matter of fact 50 sites are listed now; they could be surveyed.

127. Q. No general examination has been made !- No, and it is a very big list.

128. Q. You had to omploy famine labour during the last two years; why was nothing done towards making these

Paragraph II-

small tanks. Do you think that people would use these tanks ?—I think that they would.

Gahagan. 129. Q. For what crops?—Generally for sugaroane, be- 14 Dec. 01. cause it pays best. They got something like Rs. 100 noro of prefit on sugarcane.

130. Q. You say small irrigating onnals would not give sufficient supply P.—No; you could not irrigate sugaroan from them.

131. Q. Is there rice irrigotion in this district?—Yes, in the Nosik Division. It is about the best rice grown. I am sorry to say that there was very little this year.

182. Q. Tanks would be valuable for that ?- Yes.

133. Q. None exist at present?-I do not know whather small tanks would be useful unless they had wells under

134. Q. Would not they halp the rice if the rain failed?
-Yos. In some parts for the last mouth or se people have been using small tanks.

135. Q. Do you know any reason why tanks should not be successful?—I believe the only reason is want of water There is no other objection to tanks.

136. Q You say that in this district dry red crops don't grow under wells !—The people generally grow bajri; they don't grow sugarcane or rice.

137. Q. What aren is irrigated per kos ?-Between 4 and 5 acres with double bullocks.

138. Q. You say in a your of drought if they get water it would be very useful?—Yos.

189. Q Do you know what happened to the wells during the last four or five bod years?—I was told they generally failed.

140. Q. Did they fail in 1898 ?- No.

141. Q. In what stats are they now?—They are all dry, not a single well has a foot of water in it.

### WITNESS No. 43.-"Mr. MAHADEO CHINTAMAN KELKAB, Mamlatdar of Pimpolper.

### Answers to printed Questions.

an 191 vZ					Acres.
(a) The gross or kame is in round figure	al atea 8	of the	Tal	rka •	000,000
Deduct— Forest, unasvessed	l wasto	, eto.	٠		320,000
Remainder-					
(6) Culturable are	ca .	•	•	4	280,000
Deduct assessed we	isto—				
Unoccupied .		•			60,000
Occupied	•	•	•	•	60,000
		To	B)	•	120,000
(o) Remainder occupionally under oultive	ed cult	ivablo a	rea g	eno.	160,000
(d) Out of (b) area por (l) Government Irrelease (i.e., prive and channels efformer times and looked aft Irrigation Dopout of 166 in the (2) Private or village (3) Wells in 34 villate) Area unprotocted in 90 villages.  The proportions of as under:  (b): (d) 1	rigation rigation right on the result of the right of the	work ver ba ted by the Go thin 45 uka s irright (d) and (0,000:	ndha people rora voran vill ion w	ras) lo in lired nent nges orks ) are	95,000 2ViV 70,000 115,000

The soil in this talaka is generally of poor quality, whitish in color and recombles the Mal land of the Decean, There are some small tracts of rich soil of blackish colour in the western parts of the taluka. It differs from the very rich black soil of Eastern Decean in being much less sticky. However, it appears to be most fitted for the irrigation purposes of 280,000 acres shown under (b) being cloud 10,000 acres and dependent as a tifficial from above, about 10,000 acres are dependent on artificial friga-tion. The dry crops of bajri, cotton and kulthi are no

way dependent on artificial irrigation. But the remaining Mr. Kelkar principal crops of the taluku, viz., sugarcano, rice and wheat, are solely dependent on it. 14 Doc. 01.

Rainfall.—It is not equally distributed all over the taluka. On the eastern plains it comes to about 15 to 25 inches, while on the western hillsides and the Ghats it goes up to even 50 inches. The average rainfall at Sakri during the last 10 years was 20 inches and 60 cents. In this taluka even during the south-west measons there is ordinarily a detained on the interesting rates. is ordinatily a demand on the irrigation waters so far as the crops of sugarcane and rice are concerned. During the breaks in those mouseens these crops regults watering.

I give below the irrigated crops of the Italaka and the number of waterings they genorally require for giving a normal vield :-

Crop.	Number of waterings required for complete growth.	The time of the year during which watering is required.					
Sugarcano	25 to 30	The whole year.					
Rico*	25 to 15	6 months, June to Octo-					
Chillies	12 to 15	8 months, June to Janu-					
Wheat	3 to 4	4 months, Novomber to February.					
Gmm	2	Do. do.					
Pea, etc	2 3	8 months, November to					
Sweet potatoes	10 to 12	4 months, at any time.					
Ground-nut .	8 to 10	6 months, January to November.					

\* The best thing for rice would be to have water always flowing to tholand for the first 4 moulds.

Sugareans and rice are grown only in Thal lands, irrisgated by water from unevery bandharas, i.e., weirs constructed for the purpose of raising the level of the flowing water seroes the three rivers of Panjra, Kan and Burai and not in fields irrigated by well-water. The next four crops are also grown chiefly in the Thal lands as above, but they are also grown on well-irrigation, chiefly in villages having

Mr. Kelkar, got no river bandharas. In the Thal lande the distribu-

got no fiver banakaras. In the Thai inner the distribu-tion of irrigating woter is controlled by dividing the whole Thal area ioto four suitable parts called Phad, one of which is given to sugarcace, one to rice and two are left for the rest. The crops are token by rotation over the whole area as 1 rice, 2 sagarcone, 3 wheat, 4 gram, etc., ogain, 1 rice, 2 etc. In the case of well-irrigation the distribution deneds on the will of the owner. distribution depends on the will of the owner.

In this talnka irrigation rovenno is not realized as a separate water-rate or tax on the orop raised as in the case of first class irrigation, but as an amalgamented Knyam Bagayt-rate fixed by Survey Officers at the time of cettlement, taking into concideration the quality of the seil and the strength of the water apply in the bandhara to raise particular crops. It ranges from Rs. 3 to Rs. 15 per acre.

Paragraph III.—In this tolukn cotton is not generally sown in rich block soil but in poor soil. No tanks for irrigation purposes have been constructed in black soil in the taluka. Even in the black soil Thals there is domand for water in sessons of average rainfall and much more so in times of prolonged drought. The crops raised in such soil require to he watered oven in years of average rainfalls. In this taluka the irrigated area is fixed once for all at the time of the survey settlement and assessed at Kayam Bagant rates, and honce there is no scope for a falling off or time of the survey settlement and assessed at Kayam Bagayt ratee, and honce there is no scope for a falling oil or an increece in the irrigated area as in the case of first class irrigation. People in this talink are for a long time accustomed to irrigation and the advantages thereof, and so have been always anxious to increase the irrigation if it he possible. They know that the richer the soil the greater the profit, and so the villagers having each suitable soil in the three river valleys of the talinks are desirous of getting an opportunity for securing new or extending old irrigation. Consequently the construction of storage tanks on the three rivers to increase their pricating water supply is predicted. rivers to increase their arrigating water supply is mwaited with great lenging. There is no scope in this taluka for construction of small tanks for such or other soil either by private or hy Governmoot onterprize.

Paragraphs IV and VI.—There are no Government irrigation works as such so far os I understand the term. Irrigation works constructed and maintained at Government cost, from which water is given to intending irrigatornof londs within the reach of the obnancis on payment of fixed water-rates for particular crops by the Irrigation Department, can only be termed Government irrigation works. This irrigation, I think, is called first class irrigation. As

I have once meetioned above, irrigation works in this taluka consist of masonry bankharas or weirs obout 4 to 6 feet in height, constructed ocross the rivers of the Panjara, Kanheight, constructed ocross the rivers of the Panjara, Kanheight, to raise the level of water therein and snitable chaonels and sub-channels emanating therefrom ranging in length from I to 6 miles for irrigoting lond in one or two adjacent villages. These works have been constructed more than a century before by the villages concerned at their own cost. The work of further repairs and mointenence of these works appear to have been handed over or taken up by Government, perhaps at the time of settlement, in consideration of the large amount of revenue collected thereon, and the system is termed second class irrigation. The original enstoms and rights of the irrigators are, however, and the system is termed second class irrigation. The original enstoms and rights of the irrigators are, however, kept up intact and are very rarely interfered with. The control over the water generally is supposed to be in the hands of the village Patil, assisted by some menial servante of the village irrigators, called the Patkari and Hawaldar. The work of making petty repairs to and the cleaning of channels is generolly done by the irrigators tagether. So in fact it can be said that the distribution is really controlled by the irrigators in general, and this always gives room for high-hondedness of the Patils or big lond-holders and petty complaints to the Revonao authorities who are supposed to have general control over them. If we leave aside the factor of Government taking op the repairs and maintonaace of works, these irrigation works can be oppropriately termed village works referred to in paragraph VI. But from the above description it can be said that the irrigation works of the toloka are partly Government and partly village works. the toloka are partly Government and partly village works. In addition to these principal works there are a few villages in which some people pat up every year small kacheho are katmati temporary bandharas on nallahs or tribotaries of the rivers at their own expense, and raise minor irrigated crops of wheat, gram and pea. Hence I am going to answer both the points together.

The Irrigation in the talukn is chiefly dependent on the water supply in the three rivers mentioned above. These rivers ore small rivers toking their source in the western hills in the taluka, the northernmost branches of the Sahjadri Mountoin. Their water has been arrosted and utilized wherever possible by almost every village from the source to the mouth of each river. Consequently the irrigation in every village is solely dependent on the strength of the flow of the river water during whole of the year round. The statistice shawing the irrigating capacity and range of variation of these irrigation works are given below:—

No.	Name of River.		Name of River.		Name of Rive		Name of River.		Name of River.		Name of River.		Name of River.		Name of River.		Name of River.		Name of River.		Name of River.		Name of River.		Name of River.		Name of River.		Name of River.		Name of River.		Name of River.		Name of River.		Name of River.		Name of River.		Name of River.		Name of River.		Name of River.		Name of River.		Number of Bandharas	villates	Aren of Knyam Bagayt irrigated aores.	Maximum area irrigated in a best year.		Minimum aren irrigated in a year of drought.	
	1				(A) On	Masonry 1	Bandharas (Pak		Астев.	Yeor.	Acres.																																												
1 2 3	Pnnjara Kan Burai	•	:	•	30 19 11	17 18 8	8,3P7 1,714 .787	1898-99 . 1895-96 . 1895-96 .	9,333 1,558 718	1899-1900 1898-97 1899-1900	. 2,265 . 667 . 93																																												
			60	43	5,849	<b>619 00</b> 1		1830-20																																															

(B) On Katmati or Kachcha temporary Bandharas constructed every year.

4	Nallahs and tributaries of the three rivers.	15	15	1	••1	1898-99	110 1899-19	00 .	40	-
	1 120 11110 111111		1	- 1		1	1		٠,	

These bandharas being simple weirs to raise the level of These bandharas being simple weirs to rules the level of water have an holding capacity, and so enanot be depended on in years of drought. About six bandharas on the Panjaro and only two on the Eurai could be depended on during the last two years which were of dro-ght. On the Panjara there is comparatively a larger area of catchment and on both of them there are good perennial springs in a few places; consequently it is becoming essentially necessary to have atomore tanks on these three rivers, which, if conto have storage tanks on these three rivers, which, if constructed, will highly increase the protective volue of these works. As for the kachehu temporary bandharas (B) I may say that they cannot be depended on in a year of drought. Besides these thore are no other possible sources of irrigation. I do not know whether there has been any law passed or executive order promplested at the source wettlement. or executive order promulgated at the survey sattlement in

which the responsibilities of Government in connection with the maintenance and repairs of these bandharas have been fixed. But as for a appears from the Government records, I think the irrigated land under these bandharas has been generally assessed at increased Kayam Bagayt rates ranging from Re. 3 to 15 per acre at the time of original survey settlement, and in consideration of the large increase in the Land Revenue thereby effected Government have undertaken the naintenance and repairs to the bandharas and the main channels leading water to the village lands. For this purpose these works have been put in charge of the Irrigation Department and they construct necessary new works and execute repairs to these according to the requirements of the irrigators and the funds made available for the purpose. In this taluks about Ré. 48,000 are realised every which the responsibilities of Government in connection with

year by Government as Land Revenue from the Kayam Bagait, and on an average Rs. 9,000 are annually spent through the Irrigation Department, from whose records of these places I have gut this figure. Last year only a special famine grant of Rs. 1,070 was expended on the silt clearance of the channels on the Kan River. In the case of the kacheba bandharas no responsibility whotever rests on Government, and only a temporary water-rate on the area actually irrigated is essessed and levied by the Revenne Department as royalty on the water. This water-rate is extra for the year only and ranges from Re. 1 to Rs. 4 according to the strength of water-supply and the probable expenses incurred by the irrigators on the work.

This Kayam Bagait assessement on the irrigated lands forms part of the Land Revenue and is collected at the respective Land Revenue instalments. Its collection is not idensedent on the raising of particular crops or the less or

This Kayam Bagait assessment on the irrigated lands forms part of the Land Revenue and is collected at the respective Land Revenue instalments. Its collection is not dependent on the raising of particular crops or the less or greater supply of water from the bandharas; consequently no general remissions whatever are granted to these irrigators even if the water-supply fails portially or completely. As a consequence of this system during the last two years all the Knyam Bagait assessment was to be recovered from the well-to-do or better class peaple, oven if they could not get any or full value irrigated crops in their land. Only in the case of poorer agriculturists special famice remissions have either been granted or praposed along with other cultivaters having no irrigated lands with them. This has worked very hard upon the irrigators (specially on the Kan River) who had to pay in the midst of famine difficulties Kayam Bagait essessment at Rs. 3 to 15 for water and orops, for which, instly speaking, they should have paid much less.

Those bandharas are generally strongly built, and consequently there is very little chance of those works going out of order altogether. However, on such occasion arising, when owing to some great and accidental damage done to the bandhara or to the main channel irrigotion of the lands concerned becomes impossible, Government do not become altercilessly exacting, but on proper inquiry give general remission of the irrigation share in the Kayam Bagnit rates and recover only Jirait rates on the lands concerned. There are precedents for this statement in the case of Bhadone and Daterti bandharas. New works resembling these pakka bandharas do not appear to bare been constructed anywhore in the taluka by the people at their cost or by Government during the last 25 years or so.

bandhards do not appear to bayo been constructed anywhoro in the taluka by the people at their cost or by Government during the last 25 years or so.

I think the protective value of these works can be increased by devoting more money and great attention to their up-keep and improvement, and by constructing of hig storage tanks on the three rivers. I may illustrate this with the following observations:—

- (a) The main irrigation channels leading water from the bandharas to the lands generally got silted and at times to a very large extent, thereby annsing much obstruction to the flow of water. Consequently clearance becomes often necessary.
- (b) The bandharas also get silted if the scouring sluices are not timely opened at the time of floods. The irrigators are expected to do these works. However, in practice, unless there is a laudable unmimity about these things emeng the irrigators, which is rarely the case, these works are often neglected, being the husiness of ull or nobody. This work, if done by Government Irrigation Department at regular intervals, will not cost much to Government, but will bring much good to the irrigators and so enhance the protective value of the works. There is very little scope for encouraging lond-owners by suitable loans, etc., to construct any more new works in the talaka. In my opinion the protective value of the present works can only be increased and to a very large extent by the construction of storage tanks on the three rivers of the talaka. I would particularly arge out the necessity of taking up of the storage tank on the Kan River, as the irrigators thereon have already suffered much during the late years and particularly in the famine; and until that work is executed I would recommend general remissions being granted to these irrigators at certain fixed percentage, teking into consideration the particular circumstances of each bandhara concerned. If the three storage tanks are constructed, there will be scope for increasing the irrigation over an additional area of about 1,000 acres. The present irrigation works in this taluka do not serve any purpose concerning village water-sapply for men and cattle.

Paragraph V .- I have nothing to say with regard to Mr. Kelkar this point.

ŀ	Paragraph VII.—	1-44	14 Dec. 01
	Approximate area irrigated by wells in ordinary years	1,200	-
	Approximate area irrigated   1899-1900 by wells in years of	1,800	
	drought 1900-1901	1,600	

I am nuable to say how many now wells were coastructed annually during the last ten years. However, from what statistics I have collected I can give the following information:—

Total number	of a	grienlt	nral	wells	in	tho	
taluka	•	•		•			800
(i) Numbe							250
(2) Numbe	r of w	ells in	not un	1 150			550
(3) of (2) 'or rep	The no	mber o	of wel	lls cons	truc Tı	ted	
loons			,			.6	00

Under the present rules of Tagai advances no concessions are allowed to canstructors of new wells. I think it is possible and also desirable to stimulate the construction of new wells by more liberal advances or other inducements. In this cannettion I may point out that the existence of wells and irrigation thereon form a great protection to the enlitirators in times of famine. If there is one good well in a village in famine times, it heames a reody means for four or more families to join together and maintain themselves. This has been noticed by me during the famines of 1896-97 and 1899-1900. In this tainkn too the same was the case. From the figures that I have given above it can be seen that during the last two years obout half as much more area was irrigated on wells than in a normal year. This tainka has got only 42 villages that are protected by river irrigation works.

There are 34 that ore partially protected by well irrigation. The remaining 90 villages have got no irrigation protection at all. In the case of the last two batches of villages there is still much scope for increasing well-irrigation, and from what I have seen of the people during the last two years-and-a-half I can confidently say that the people have an aplitade for well-irrigation end can with advantage he indaced to take to it. But under the present system of Tegai advances it becomes rather difficult to push on the system, as the cultivators in these villages are generally poorer classes and bave not sufficient security to offer or are not in a position to hear the inevitable results of a failure in the work. Under the circumstances I believe that a more liberal cystem of Tagai advances, in which remission of interest and partial or total remission of the advance in case of failure of attempt to obtain water would he passible, will stimulate the construction of new wells and increased well-irrigation.

Though there has been so increase in the irrigated area or welle during the lest two years, still I think that the supply of water in wells is affected to some extent by the drongbt during the period, and during the current year the affection has been very mash as a result of the previous scarcity of rain. Some of the wells that had become dry were deepened with good results. No statistics as to how many failed entirely or were abandoned is available; still from my observation I may say that such instances were rare. In this taluka one has generally to go down about 20 to 30 feet from the surface of the earth before he can top water, and the construction of an average well ready for irrigation costs about Rs. 150 to Rs. 200. Such a well serves an average area of 4 acres.

Paragraph VIII.—In this talaka instances of lands or crops being injured by water-logging or excess of water even in very wet years are not known. I have noticed as droinage works here, and I do not think any are required on any grounds.

Paragraph IX.—During the last famine no relief labour was employed in this taluka, which was seriously affected, on only irrigation works. It was chiefly employed on metal-brenking for Local Fund and Provincial roads and construction of new roads. The Ghorda-Chinchpada Road was taken up and left nnfinished. Some small works in Government forests were also andertaken as far as I know. I am onablo to say how much measey was spent on the first two works. Last year about Rs. 800 were spent on the first two works. Last year about Rs. 800 were spent on clearing of silt from two village tanks useful for mon

Mr. Kelkur. and cattle only, and as n consequence they have become more neeful. I think it is desirable to complete the construction of the Ghorda-Chinchpada Road, as it forms part of the Prorincial Trunk-road from Dhulia to Sarat and also will be neeful as a road facilitating communication from Pimpalner, the most important commercial town of the taluka, to the Chinchpada Station on the Tapti Valley Railway.

> Paragraphs XII and XIII .- The etatistics and tho Information referred to in these paragraphs relate to first olses irrigation, and so are not available here.

Paragraph XIV.—As for the protective value of the cxisting second class irrigation works in the taluka, I have made some observations in numbering soms of the previous paragraphs. I have, however, to say something on the points referred to in this paragraph. From my inquiry in the taluka I learn that the protective value of those works was best exemplified during the famine of 1896-97. During the early period of the mensoons of 1896 nn abnormally high rainfall was experienced in this taloka, and that had the result of keeping up a good supply of water in the bandharas to n maximum strength. This gave the irrigatous an excellent rabi harvest and afforded a very large field for agricultural labour to the irrigated mill mon-irrigated villages in their vicinity as well. Generally overy normal year the harvest of sugarcane-pressing and wheat-reaping affords much labour. Under the circumstances, though all the non-irrigated kharif villages had to face a scarcity of grain and labour that year, still the irrigated villages heing much botter off inforded a great protection to these villages also. While during the last famine the irrigated villages having suffered for want of water in the rivers excepted. irrigated villages having suffered for want of water in the rivers concerned, the scales were turned and the talnka as a rivere concerned, the scales were turned and the talinka & a whole had to undergo a very serious distress. Relief works, poor-houses, kitchons, and extensive dole lists had to be opened, and very largo amounts from tagai and Indian Charitable Funds had to be advanced for infording relief to the people during the year 1899-1900, while very little in the sort had to be done during 1896-97. I am, however, not in a position to say to what extent the cost of famine relief would have been increased if these works had not hear in contration. been in operation.

#### A .- GENERAL.

- 1. These answers refer to the Pimpalner taluka of Khunde-h district. I have been working at this taluka as a Mamiatdar since July 1899, and the following nuswers are based on what I have observed personally of the people and the crops and on anthentic information collected by
- 2. The average minfall in each month for the last 10 Acare is Giaon pejou :-

Month	Inche	. Cculs.	Month.	Inches. Ceuts.		
January February March April May Juno	. 0	5 3 1 6 6 5 40	July . Angust . September October . November December	•	5 3 4 1 0	6 18 1 55 41 2

- 3. I do not think there is any observed to the extension of irrigation within certain limits in this talnes. Supposing rhat storage tanks are constructed on the three : of the taluka and a steady and sufficient water-snpply is kept up in the bandbaras, I think that shout 1,000 neres can be easily ndded to the total irrigated area of the taluke, which is about 6,000 acres. There may be more scope for further extension if water is available, but then'I think some obstacles will have to be faced, chiefly arising from-
  - (1) sparsity of population;
  - (2) lack of capital for the initial experditure for grawing the more expensive irrigated crops; and
  - (3) want of labourers.

The taluka is thinly populated and has get a very large culturable area (280,000 acres). Consequence is that more thin 20 per cent. of it is lying as unoccupied assessed land and as much lies fallow every year from the ozenpied land. However, there is a very extensive grazing land available

and so the people have greatly advantageous opportunity of keeping and breeding a large stock of agricultural cattle, chiefly cows and bullocks, and they make use of it to their ndrautage. Before the late famine this taluka was very rich in this respect ned now, though it has lost about 50 per coot. or more of these, still I think they will regain their strength in this respect if a few good seasons follow continuously. The bollocks that are bred in this taluka are of superior quality and quite suited to the cultivation of irrigated lands. The nhundance of cattle supplies good and abundant manure. The soil is, I think, snited for the bandhara irrigation, as it is not like the rich black cotton soil. Excepting the last faw years, the measons are known and so the people have greatly advantageous opportunity of had abundant manure. The soil is, I think, shifted for the bandhara irrigation, as it is not like the rich black cotton soil. Excepting the last faw years, the measons are known to be sufficiently regular in the commencement and cessation and hence no uncartainty of the supply of water is over known to have affected the crops. I think there is sufficient capital in the taluka and the banias have been found to be generally willing to invest capital in the irrigated land. The people appear to be generally satisfied with the existing revenue assessment and will not neglect irrigation for fear of cahanced rates. The number of cultivators of land being small as compared to the extent of agricoltoral land, they get lands, even irrigated, at very moderate rent med so have no fear on that account. I have not heard of any complaint about necertainty of tenure or the tenancy law, nor do I think there is any scope for such complaint nader the present Land Revenue Code. In the present state of the taluka, in a year of good kharif and rabi harvest there is n want felt of sufficient number of field lubourers, and nages go much higher than what they are at present. But I think, if more irrigation is possible the grains will naturally a tract sufficient numbers from the surrounding villages and taluks. bers from the surrounding villages and talukss.

- 4. No new irrigation works have been constructed in the 4. No new irrigation works have been constructed in the talaka for a long time by private capital and no instances of exemptions of enhanced assessments are known. I do not think there is much scope now in the taluka for any nore permanent irrigation works being constructed by private capital. But if any were possible, I would certainly recommend some liberal measures, such os granting of exemption of the bagalt assessment on the land irrigated for a certain number of years, say, 30, according to the expenses incurred and the water-supply minimationed.
- 5. There are no instances of tagai loans being taken for construction of irrigation work such as bandharas, etc. 5. There are no instances of tagai loans being taken for construction of irrigation work such as Landharas, etc. However, people have taken to well-irrigation in villages having no river irrigation since the last famine and are now gradually taking a liking for tagai loans. During the last two years about Rs. 8,000 were given for construction of new and repairs of old wells. There is, however, much scope for a large extension of this kind of irrigation in the taluka. Under the present system, however, it becomes rather difficult for the people to necept and for us to give any very large advances for the purpose. The people who are chiefly in need of well-irrigation belong to poorer classes and have got no sufficient security to give for the loans. As jimit land is comparatively very cheap in the talaka, we do not advance generally more than five times the amount of assessment on the land offered as security. Consequently one who reks for a loan of Rs. 100 has to offer security of hand assessed at Rs. 20 or thereabout, which is not always practicable. For such loans personal security cannot generally be depended on and solvent cultivators do not generally offer to stand security for such people. Consequently for this taluka at least I would strongly recommend any or all of the liberal measures given below:—
  - (1) Reduction of the rate of interest.
  - (2) Remission of the interest.
    (3) Partial remission of the advance.
  - (4) Total remission of the advance in case of failure of the attempt to obtain water.

As the present rules stand. I think no extension of period of repayment is necessary. The well tagai loans never exceed Rs. 300 in each case, and I think a period of 12 to 15 years is quite sufficient for the convenient repayment of the loan with interest.

6. I do not think the extension of irrigation tends to 6. I do not think the extension of irrigation tends to injure the remaining cultivation by attracting its cultivators to the irrigated tracts. No instances of this sort are heard of in this taluka. People of this taluka are accustomed to irrigation and know the becefits thereof and so have evinced a strong desire to have means of irrigation increased.

#### B.—Canals of Continuous Flow.

My remarks under this head are based on the results of second class irrigation, under which systom thore is always a fixed area irrigated under each bandhura and this whole area is assessed at Kaynm Bagnit rates (permanent amalgamated Land Revonue and water-rate) independent of the kind of crop produced or water netually supplied. I have had no experience of first class irrigation.

Irrigation increases the value of the produce of the land to the following extent:-

- (1) By rendering it pessible to cultivate two harvests instead of one.
- (2) By leading to the substitution of more for 4 to 5 do. do. less valuable crops.
- (3) By increasing the yield-

(a) in a year of ample nainfall.

(b) in a year of scanty rminfall.

(c) in a year of drought.

Sneh cases are very rare. I have not seen of lands irrigated simply with the object of increasing the usual Jirait yield.

In a year of sennty minfell or a drought the Jirait or first crops in the irrigated area is at times watered by the channel water, as there is then no hope of securing the Yagait crop. This way the ouners of land succeed in gedding n good and more valuable (on necount of searcity) limit crop. But I do not consider this to be any substantial increase in the value of the produce; on the other hand, it has to be remembered that the owner has to pay the full Kayam Bagait assessment under the present system of Land Revenue cellections.

- 8. (1) As for the approximate ortimate of the increase in the tetal annual value of the produce per acre due to irrigation. I have got no special statistics collected; still from a clese inquiry with some of the experienced cultivaters in the taluka I have got the following data and have prepared an estimate for a village which has got 300 nores of irrigated land on the Kan River and where the irrigators have to pay Rs. 8 per sore as Kajam Bagait assessment. When four successive normal years follow the irrigations got a full rotation of props and so can be said to have enjoyed the full advantage of irrigation. I give lin Appendix A, attached hereto, my estimate of the not value of produce per acre of Thal land (i.e., ordinary good level land enlivated) irrigated, as compared with the same when unirrigated. From the figures it will be seen that in the tirst case the increase is approximately three times as much.
- (2) In a year of drought, if the water could be kept up to its full strength, there would be further gain on account of the high prices of the anturn. But if the supply would foil, the irrigator will even find it very difficult to have a khanif crop.
- 9. (1) There are no cases of cultivators or owners of lands paying annual water-rate to the owner of the canal.
- (2) If a tenant caltivates irrigated land as a tenant of the owner, he pays from Rs. 5 to 10 per sere in addition to the Kayam Bagait assessment.
- .(3) The owners of irrigated land pay to Gevernment an amalgamated Kayam Bagait rute from Rs. 3 to 15 per nore, instead of the jirait rate from munus 8 to Re. 1.

In the two cases above cited the tenant pays the rent on the irrigated area longed out to him under the agreement and in the third case the owner has to pay on the whole irrigable land he helds in the irrigated Thal area, irrespective of the crop raised or water supplied.

10. The irrigator has very little expendilure to incur to bring the water to the field from the nain channel. He has, however, to prepare the land to be irrigated much more enrefully and diligently than in the case of jirait land. He has to put in it mannre worth about Rs. 5 on an average per acre per year and to till and turn it over and over from 4 to 10 times even. When such land is leased to a teamnt, the landlord either shares the oxtra expenditure or the tenant gets a lease for lengthened period of about 10 to 20 years as a guarantee.

11. The irrigators whe do not manure their lands preparly certainly suffer in not getting a full and valuable
erep. I have, however, not heard of any land deteriorated
for being arrigated without manure, or from the prefuse or
too extensive or too frequent irrigation, from water-legging,
salt efflersscence or otherwise. In this taluka I have
housh that inthe irrigated hands in some villages there is a
regular arrangement of draining away excess water of
irrigation, and thus certainly riundness to the welfare of the
crep.

### C .- CANALS OF INTERMITTENT FLOW.

Mr., Kelkar.

14 Dec. 01:

Such canals are very few in this taluka and the area irrigated by them annually is quite ineignificant. Consequently I have very few occasions to nequire detailed intermediate in ennection with them. They are simple temporary earthen dams put across a flewing unlighted direct water therefrom for irrigating a few adjacent survey numbers. They are generally erected at a cost ranging between Re. 5 to Re. 25 and irrigate only a few acros. Ou their water the crops of wheat, gram or pea are only taken, and their flow lade for about two to four months in an average rainfall season. The owners of the irrigated lands themselves do all the work in connection with them and onjoy the beaefit thereon by paying an extra water-rate of Re. 1 to Re. 4 per acro. I think it is advisable to stimulate this kind of irrigation by means of suitable tagai advances. However, people in this taluka have not shown any very ardent desire to extend such irrigation. I also think that there is not much scope for extension of this irrigation. I am not in a position to answer in more detail the questions New 12 to 22, and so leave them with these remarks.

#### D .-- TANKS.

There is no irrigation carried on the water from tanks in this taloka ; consequently I have nothing to say with regard to questions Nos. 23 to 33.

#### E .- WELLS

34. In this taluka wells are generally dug in the castern plains, where there is no scope for river-irrigation. These wells are generally of very small size. They are rectangular in form and of fellowing dimensions:—

#### 6' x8' or 8' x 10'

Consequently they have very small helding capacity as compared with the big wells of the Eastern Decean. The depth of water is generally from 4 to 10 feet. The quantity is only sufficient for the requirements of a day or two, but it is renewed from percelation or side springs within the breaks in the irrigation work.

- (1) The average depth of permanent wells is from 20 to 30 feet.
- (2) The supply of water on this side is from percolation from the sides and not from springs from the bettem. They are not seen to become any way saline anywhere, but the supply is liable to fail in years of drought. But experience shows that the supply is chiefly affected during the year fullewing the year of drought, if that year rainfall is again seamty. In ordinary years they do not full appreciably.
- (3) Average cost of construction is Rs. 150 to Rs. 200.
- (4) A properly constructed well built on four sides is said to last even for 100 years.
- (5) Water is movally lifted by means of leather water lifts or mote generally drawn by two bullecks.
- (6) The average men attached to and commanded by a well is about 16 to 20 acres.
- (7) The average area irrigated in one year is about 3 or 4 acres. This is due to the very small holding capacity of the wells.

35 and 36. In the case of well-irrigation I have not been able to obtain authennic information pertaining to the points noted in those questions, still from my general information I make the following few remarks. Well-irrigation requires much more labour from man and bullacke than bandharairrigation. It supplies the cultivator with ready means of subsistence in times of famino. Sweet potatees, chilli, vegetable, wheat and other minor crops are grown on well water, and consequently no accurate estimate chuld be francel ensily as to the extent of increase in the value of the produce of land or in its total annual value per acre. On the whole it can be said that the cultivator gets about 3 or 4 times the value of the jirait crop on the same land.

37. There are rure instances here of land-owners of well-irrighted fields lensing them out to tonants, so i cannot say as to what do the tenants pay to them for these lands. On referring to the Government records of villages having wells constructed before the time of the original Survey Settlement, I find that he special bagait assessment or motosthal rate has been assessed on these lands. Consequently, Yimve're say into an additional revenue for the well-mater has been paid by the owners of fields to Government. In other districts I have known that on such lands an additional rate called motostkal rate is levied.

Mr. Kelkar.

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38. I do not think any serious difficulties are over encountered by the people in selecting a copt for proposed wello or in their actual construction. They generally celect a place of themcolves from the surroundings and at times a few people are seen to be inclined to call in the aid of an expect of a Publisher (i.e. one who is supposed to a now people are seen to be instituted to can in the are of an expert or a Panbhakya (i.e., ons who is supposed to forotell the existence of water in particular place or otherwise) at their own cost; as for construction there is ample supply of suitable otime and other materials required in supply of suitable etme and other materials required in the taluka. As yet there have been no fastances in which assistance was offered by Government or by local bodies in the shape of expert ndvice, trial berings, etc. I think that euch assistance can with advantage be given by making, if pussible, the genlogical survey of the portions of the taluka in question and chiefly by free grant or grant at a very moderate rental of the use of beriag tools in the wells in which water is despaired of by ordinary means available to the owner of the land. Trial borings also may prove of some value. As far as my experience goes I have found the people to dig their own wells without asking for any leass for the purpose, but when they make cure that there is water available and the work is being worth constructed they come up for a loan. they come up for a loan.

- 39. I nm not in favour of the construction by Government of wells in land which is private property, as I think the scheme will not be liked or agreed to by most of the people.
  - (1) Construction of wells by private agency is far more casy and much less expensive than by Government agency. I think that a well which agriculturisto construct for its 200, will cost Government at least Rs. 300, if not more.
  - (2) Government wilt not be prepared to invest fends in such works if they are not used by the people concerned and if they will not get any retorn therefor in the form of additional water-rate at least on the land likely to be irrigated from them. This would necessitate the passing of certain agreement by the parties concerned, from which they can never recede afterwards. Cultivators will not be ready to accept the responsibility so

- 40. If by temporary wells are meant bludkis or other similar kaoheha wells, then I say that snob wells are very rarely constructed in this taluka. There are some wells in the taluka which consist of only holes dug deep with water in them, and without any mesonry work, on which some land is sometimes irrigated by means of temperary arrangement on a wanden structure for raising water by a lenther mot or water-lift. These are not properly speaking temperary wells but knohela wells. I do not think any particular measures are necessary to encaurage the construction of such wells in a year of seasty rainfall.

P.S.-With reference to question No. 5, I have to add a few remarks and I hope they may be take for what they are worth. Against the present tagai system always two objections are chiefly raised: (1) that the recipients of the leans do not get those promptly as they get them from the sowkars; and (2) that they have to catisfy the demands of blockmailing by subordionto Revenue Officers.

As regards tha first objection, I think that the objects for which tagni loans are asked for under the Land Improvement Loans Act, 1883, are not emergent and innoinent necessities like the demands under the Agriculturists' Loans Act, 1884. Consequently, the grauting of these can brook the delay without much injury to anybody, that is, at times inevitable on a second of delailed in quiry that is to be made through the already bard-worked Rerenue Officers. I do not think the people are any way discouraged by this delay from coming up tendily for Land Improvement Loans. Improvement Loans.

As for the other objection, every officer who had to do something with these advances will have to admit that under the present system the evil is to some extent inevitable, as the very low-paid village officers cannot but be taken into confidence by the inquiring officer, how-sever he may try to be independent of them. The evil is only minimised if the Revenue Officer has the experience enough to see through their tactics and has a will to undergo a little more trouble presents to make present inquiries at the villages. tronble neces-ary to make personal inquiries at the villages

Statement showing the estimate of the increase in value of the produce in an acre of irrigated That land over that in unirrigated one.

Y1 Ap.		Cuor		Gross value of Crop Raised in hypels		L'APPARPS EXCLUDING THE COST OF CULTIVATION  AS HEGGRIDS THE BULLDCKS AND CULTIVA- TOR'S OWN LABOUD.						
	Kharif.	Rabi.	Kharif.	Rabi.	Total,	Govern- ment narcis- ment.	Manure.	Sred,	We ding, (tc.	Pressing charges	Total,	Net benefit
lst year	. Bajri or 1ili	Wheat or grain	Bag 18	ail ero	p eeli 35	mafe. Its. B	Rs.	Re.	Rs. 2	R•,	R4 13	Rt.
40%	Rice Sognreame .	Or per Wheat single crop	35 180 40	#: #:	35 150 40	8 8 8	20	3 12 3	10 2	25 	13 75 18	22, 75 27
		Total , Average ,	213	17	2(0	52		21	16	25	114 28'8	146 36·8
Every year	. Bajti or tili	******	Jir 18	ail ero	p estim 18	ale in un I	irrigal 	ed Tha C-S-0	l land. 1-8-0	•••	3	15

- 1. Q. (The President).—You are Mamlatdar of Pimpaluer?—Yes.
- 2. Q. How long have you held that office !- For 23
- S. Q. Were you there during famine? Yes.
- 4. Q. You I nve sent in a very interesting paper containing a great deal of detailed information. You say the culturable area is 220,000 neres? Yes.
- 5. Q. Of these 165,000 are protected by bandharas and wells?—The largest area is under bandharas. The whole area is not, lowever, uctually irrigated.
- 6. Q. About how much of the nrea is irrigated?—About 6,000 acres under bandharas and 3,000 neres under wells.

- 7. Q. Out of 95,000?-6,000 only.
- 8. Q. That is very little?—Yos.
  9. Q. There are wells in 31 vallages?—Yis.
- 10. Q. The area under them is 70,000?—The total area in 34 villages under wells is 2,000 oat of the total culturable area of 70,000.
- 11. Q. About how much does each well irrigate?—About 3 or 4 neres.
- 12. Q. You only in your reply to printed questions "people in this talaka are for a long time accustomed to irrigation." Is there any domand for an increase in the number of band haras!—No; I do not think there is any scope for more bandharas, but if there was a better water-supply a larger area could be brigated.

- '13. Q. You say only about 8,000 acres are actually 'irrigated every year?—Yes.
- 14. Q. Are the people very anxious to irrigate more?— Yes, there have been several petitions for a storage tank on the Kan river; that implies that if the present supply of water is increased a greater area will be trigated.
- 15. Q. Tanks are better than wells ?—Yes; and inquiries have been made about constructing storage tanks; last year a project was frained to make a tank on the Kan river, but I think it was rejected.
- 16. Q. Are there any disputes among the villagers about the distribution of water from these bandharas?—If there is only one village under the bandhara, then there is no dispute; but if the water goes down to two or more villages from the same bandhara then generally there are disputes; but people manage to take the water by turns. If the Irrigation Department distributes water by means of distribution pipes to two villages at the same time, then that gives cause for complaint; but if there are turns fixed, then there are no comploints.
- 17. Q. To whom do they complain?—To the Irrigation Department and also to the Collector.
- 18. Q. Are there any sites in your talnka in which storage reservoirs might be made?—Tes; there are. There is one on the Panjara river; one on the Kan, and one on the Burai.
- 19. Q. Have they been examined?—Yes, the Panjara project was considered some years ago. The project on the Kan was submitted but was rejected. There was some correspondence about the Burai river project and it was surveyed last year.
- 20. Q. You say, "I would particularly urgo on the necessity of taking up the storage tank on the Kan river." That is the one you have just mentioned?—Yes.
- 21. Q. What was the name of the proposed tank?—The Malangam tank at Dahiwel.
  - 22. Q. Was Dahiwel tank begun as a famine work?-No.
- 23. Q. Do you think it is very important for your taluka?—Yes; for I think bandharas on the Pavjara are better placed than on the Kan.
- 24. Q. Is there any demand for an increase of well-irrigation?—Yes, there has been since the last famine.
- 25. Q. Are taken indvances in demand?—Yes, during the last two years I have given about Rs. 8,000 for wells.
- 26. Q. Do the people often come to you for takavi ?— First they make petitions to me and in the course of time. I submit them to the Prant who sanctions the grants.
- 27. Q. Do they make any complaints about the rate of interest or about the time allowed for repayment?—No, because the time allowed is quite sufficient.
- 28. Q. How long does it teke a man to got his advance?—Generally he gots it within 2 or 3 months.
  - 29. Q. Do they pay 5 per cent. P-Yes.
  - 30. Q. De they complain about it ?-I de not think so.
  - 31. Q. (Mr. Ibbeton).—How long have you known this district ?—I have been in this district for 25 years.
    - 32. Q. Where were you before that P-In Satara.
    - 33. Q. Is there much wheat grown there?-Yos.
    - 34. Q. A very large area?-Yes.
    - 35. Q. Is the area more than that under rice?-Yes.
- 36. Q. You say there is no scope in this taluka for the construction of smell tanks?—Yes; I mean tanks for irrigation.
  - 37. Q. Why?—Because there are very few sites at present in my taluka suitable for that purpose.
    - 38. Q. There are no sites !-- Vory few.
  - 59. Q. If there were eites !- Then I think more could be done.
    - 40. Q. Would you recommend many tanks ?-Yes.
  - 41. Q. Do you think the people would use the water P-Yes, after they get used to that sort of irrigation.
  - 42. Q. If they use water from the canals, bandharas, and wells, is there any reason why they should not use water from tanks?—Nothing in particular.
    - 43. Q. Would it be useful for rice ?-Yes.
  - 44. Q. Could they grow wheat here if they got water for irrigation only up to the end of December or must they have

- the water later on ?—They must have the water till the end Mr. Kelkur. of February.
- 45. Q. The wheat crop would fail if the water failed 14 Dec. (1. before that P-Yes.
- 46. Q. You say that kachcha bandharas do a great deal of good in ordinary years although they are not much used in years of drought?—Yes, because in a year of drought there is not sufficient water for the bandharas to irrigate groups.
- 47. Q. If there is not enough water on the kacheha bandharas then there are the pakka bandharas that can be used ? —Yes, the pakka bandharas are on a personnial stream.
  - 48. Q. Are they useful in ordinary years ?-Yes.
- 49. Q. (Mr. Muir-Mackenzie).—The population is very backward P—Yes; the cultivated area is very large as compared with the population, and consequently the people enunction toultivate a larger area.
- 50. Q. Inigation increases the value of the crop a good deal?—Yes, about three or four times.
- Q. Do you think the rate of interest prevents the people from taking takavi?—No.
- 52. Q. Sopposing you said to a man, "you can use the water free of charge," do you think that he would make a kachcha bandhara?—Yes; he would be induced to do it.
- 63. Q. Would you make many more pakka bandharas?—No, because there are no percunial streams other than the three rivers mentioned above.
- 54. Q. Were any of the takavi wells made in the famine of 1896 or 1899?—In 1899 famine.
- 55. Q. Are they pakka?—Yes, some of them; and some of their are kacheha.
- 56. Q. Do you think they will be used P-Yes; because generally I find that in villages where there is no bandhara irrigation people take to well irrigation, but where there is bandhara irrigation people do not like wells.
- 57. Q. Why are half of the number of wells marked as out of neo?—Because they are not used for one reason or another.
- 58. Q. How is the area irrigeted by wells increased by 50 per cent. in the year of drought?—Because then there is no dry crop. In my talnka there are large dry crop areas, and the people don't care to have well irrigation.
- 59. Q. At what rate of interest could a cultivator borrow money from a banis ?—At about 12 per cent.
- 60. Q. Then they don't complain of the Re. 5 rate charged by Government P—No.
  - 01. Q. You don't think it is heavy P-No.
  - 62. Q. Will you recommend it being reduced .- Yes.
- 63. Q. Why?—To induos people to come forward and make wells where there are no wells. It would be a real inducement, while it would not make any serious difference to Government.
- 64. Q. Would it make any difference in the case of an eutire remission?—There would be a difference.
- 65. Q. (Mr. Ibbetson).—What remission?—Remission of a takavi advance in the event of no water boing found.
- 66. Q. What would you remit?—I should remit all the money spent for the purpose of sinking the well if water is not found.
- 67. Q. How are you to know how much has been spont?—That can be ascertained.
- 68. Q. Do you think there would be no difficulty about that P—No.
- 69. Q. Supposing a man borrows Es. 500 for a well and spends some portion of it on a wedding, how would you know how much he had spent on the well?—By a panchnama. Besides I would not give him the whole advance unless he finds water.
- 70. Q. Would you work with the trial shaft first? -Yos, Rs. 25 should be given to begin the work with the shaft.
- 71. Q. You would never give an advance unless there is water?—Yes; I have never done so.
- 72. Q. Do the people know that they will be assessed on wells which they make?—They think that at the time of the Revision Settlement they will be assessed. That is my supposition.
  - 73. Q. Don't they know what the law is ?-No.
  - 74. Q. Do you think they are assessed more?—Yes.
- 75, Q What scenrity do you take?—We generally take the land as security.

Mr. Kelkar. 76. Q. What olse ?-Nothing.

77. Q. Is the land sufficient accurity ?-It would be 14 Dec. 01. after the well is constructed.

- 78. Q. There are I suppose cases in which a man's whole laud is not a sufficient accurity?—Yes, there have been soch instences.
- 79. Q. How mony years do you generally allow for recovering the loan?—Up to eight years, with instalments of from Rs. 15 to Rs. 25.
  - 80. Q. The lew allows up to 20?-Yes.
- 81. Q. Do you think eight years are enough ?—I think they are with shout Rs. 15 to Rs. 20 as annual instalments. It would depend an the amount odvanced.
- 82. Q. Would you recommend from 12 to 15 years P— That should be the maximum time ellowed for a losn of Ils. 300.
- 83. Q. Do you ever give more than 8 years ?—If a man gets Rs. 250 or Rs. 800 we give more than ten years.
- gets ks. 250 or ks. 300 we give more than ten years.

  84. Q. You say "oven in the black soil thals there is demand for water in seasons of average rainfall and much more so in timee of prolonged drought." Have you ever seen black eoil irrigated here?—I hove described it in my paper; the black soil in my taluka is not black cotton soil; it appears black in coloor, but I do not think it is the some es the block cotton soil of Gojarat in quality.
  - 85. Q. Is it irrigated ?-Yes, it gives a very good crop.
- 86. Q. (Mr. Rajaratna Mdlr'.-The present rale is that
- 87. Q. In the case of a poor rayat, would you not extend the period supposing he tokes Rs. 100?—That would depend upon the produce that he would get on the outlay. He should get out of debt as soon as possible and so I won't recommend a longer period.

88. Q. If he chooses to do so, he can pay within the period?—Yes.

- 69. Q. Would it be an inducement to extoud the period to 30 years?—Yes, in the case of large loans. Under additionary circums ances the people glodly poy Rs. 10 or Rs. 12 n year.
- 90. Q. You say that the rayats are not aware that their improvements will not be taxed of the next revision of settlement. Are they under the impression that there will be an enhancement?—Yes. There will be enhancement ou account of higher prices; but the people won't believe that it is on account of the increased prices; they will only think that it is an increased assessment.
- 91. Q. The increase on had in which a well is constructed will not be higher than the increase upon lond which

hos no woll?—Undor the Land Revenue Gode I don't be think it should be higher.

- 92. Q. Should there he a guarantee to the rayat that improvements are not to be taxed ?-Yes.
- 98. Q. Do you think the matter should be explained to them P-Yes; that would indoce them to take loans.
- 94. Q. If the fucts ure properly explained to them, would they take more taken if -Yes, it would stimulate them to do
- 95. Q. Do you think the rayats know the value of irriga-tion f—They don't like well irrigation in my taluka. They prefer bandhara irrigation because it is very easy to Well irrigation takes more time, money, and labour.
- 96. Q. Are there possibilities of extending bandhara irrigation?-How many acres more would you irrigate ?-About 1,000.
- 97. Q. On the existing or new bandharas? Under the existing bandharas; there could be no new bandharas. If you make a new bandhara between two bandharas, the people would object to it.
- 98. Q. The new bandharas would effect the supply of lower bandharas?—Yes, consequently there would be objection to the making of new bandharas. If there is a storage tonk that would increase the emply of water and that would give them the opportunity of extending irrigation.
  - 99. Q. You would rother have u storage tank ?-Yes.
- 100. Q. Do you think the people would be willing to construct these tanks if they were exempted from puying water rate?—No; because they would not have sufficient fands.
- 101. Q. You refer to the necessity for granting remissions on certain bandharas if storage reservoirs are not con-structed?—Yes, I refer to the Kan river.
- 102. Q. Are the lands not irrigated from bandharus?— Yee, they ore. But they don't give very valuable crops. Where they esed to get sugarcane erop before, new it is not possible for them to get it.
- 103. Q. What is that due to !-On account of the diminished supply of water in the river.
- 104. Q. What assessment do they pay?—Full assessment. The consolidated assessment has been based on the rotation of crops.
- 105. Q. For how long has cultivation of sogarcane disappeared?—I think for about twenty years in some villages.
- 106. Q. In this case you would recommend the reduction of ossessment?—Yes, but I would not recommend reduction on all areas. In the case of villages where there are tion on all areas. ne complaints I would not recommend any reduction.

WITNESS No. 44-ME. R. B. STEWART, COLLECTOR OF KHANDESH.

- Mr. Stewart. 1. Q. (Mr. Muir-Mackenzie).—Wore you in the Pauch Mahels doring the famine?—Yes.
- 14 Dec. 01. 2. Q. Were many kachcha wolls dried up?-Yca; B good many.
  - 3. Q. Were they spread over a large area ? Yes; they were used for irrigating grain and fodder crops.
  - 4. Q. How many cores did each well irrigate ?- I de not remember.
  - 5. Q. About 2 or 3?-I eboold think about 4; I om not certuio.
  - 6. Q. Did cook well cost moch?—No, very little. Wo only advanced R30 to R60 as takavi. They dug the wells themselves, what they wanted money for ohiefly was water bege, ropes, etc.
  - 7. Q. I suppose at the end of September you stopped odvancing takavi for wells?—No; we gove a good deal after September; I went there in the middle of September; wo made considerable odvances efter that. I um pretty sure that we mude odvances even in January.
    - 8. Q. For welle ?- Yes.
  - 9. Q. Is a large amount of takovi given out in the Panch Mahals ofter September in ordinary years?-No.
  - 10 Q. Do you think that it would be a good thing if in case of the failure of raine before September measures were taken to distribute a large amount of takavi to

- enable the people to construct kacheha wells?—Yes. "
  provided the people will utilize the wells. In one case a
  Patel told me that he had four oxen, of which three hed died owing to drought, and he had a well the whole time.
- 11. Q. He made no attempt whatever to irrigate o crop?—No.
- 12. Q. If money was available he could have got some? -Yes, but he did not want it in that particular instance.
- 13. Q. The system should be to give takayi advances by the end of September if rain fails, for kachcha wells?—
- 14. Q. On whot was famine labour particular employed in the Panch Mehala?—On roude principally. particularly
- 15. Q. And on what else?—On tanks so far as we could get sites. We could not get very many.
- 16. Q. Do you prefer tenks to roads ?—Yes; I prefer lerge tanks. I have not had much experience of smell village tunks; we have tried them end I thinkthoy are very difficult to mnoago.
- 17. Q. Difficult to supervise P—Yes; we had vory great difficulty in getting establishment. We had to employ Telatis for these works. It is difficult, to make them understand what is wented of them and as a consequence in mony instances they moddled matters.
- 18. Q. You think either large or small tanks should be made by famine laboor?—Yes.

- 19. Q. If tanks ore mode do you think the water will be used in ordinary years?—No; the people would not use the tanks in ordinary years.
- 20. Q. But they got a superior crop by irrigation ?-I doubt if the majority would appreciate is. The Kolis are in the majority, and I doubt very much whether they would take advantage of the water on account of the extra labour involved.
- 21. Q. Would the water not be taken up by the Bhils even for rice?—No; the Bhils as a chies ere not very good or industrious cultivators.
- 22. Q. Are there not a sufficiently intelligent number among them who would build kachcha wells?—Kachcha wells are built more in the west than in the east. The district is divided into two parts. There are not many kachcha wells in the Bbil region.
- 23. Q. I presume that the introduction of taker would not induce such people to dig many wells?—I do not think it would. There are places where they could dig wells in the Panch Mahals but they do not care to do se.
  - 21 Q. In 1896-97 you wore in Nasik P-Yes.
  - 25. Q. You know all this area very well?-Yes.
- 26. Q. Do you think that the river supply without any big storage tank will generally give a sufficient water-supply for these bandharas?—It will generally suffice for the existing area, but it is not safe without e reservoir.
- 27. Q. Would you prefer a series of storage tanks ?-Yes, cortainly; as they coold supplement irrigation in good years if necessiry.
- 28. Q. Wos much takavi granted in 1896-97 in Nasik?
- 20, Q. Was there a demand for much more than was granted?-Ne, I don't think so,
- 30. Q. What step would you suggest for stimulating the demand for the purpose of building wells? Do you suggest any olteration in the rules in the shape of lower interest or longer periods for payment of instalments?—I don't thank you want either. The interest is very small compared with the bazaar rate and the present period is quite long enough. It is not necessary to create a fictitious demand. Once of our Deputy Collectors gave away enormous sums of money in one year for takavi which was not used for spricultural purposes. used for agricultural purpo-os.
- 31. Q. It was misappropriated?—Yes; but there are real demands in particular parts, and we ought to see that they get money easily.
- 32. Q. Do you think that the rate of interest is a deter-rent?—I do not think so.
- 3°. Q. You say the people could be induced to take advances, but would they take them on the clear underadvances, but would they take them on the clear undorstanding that the money would have to be spent on wells?

  —Yes, certainly they know that perfectly well. I know of a few cases where money has been misappropriated in my charga; but it was perfectly easy to recover it at once. In a certain village there were 2 or 3 people who took about ha, 200 each for wells, and two menths later the Mamlatdar reported that they had not commenced digging. I directed him to recover the money and he did so.
- 31. Q. They probably had not spent the money ?- No. so it was easy to give it back.
- 35 Q. The only thing that would induce people to take takavi for wells is the personal energy and infloence of individual officers?—Yes, that is so.
- NG. Q. (Mr. Rajaratna Mdlr.)—Do you pey the takavi in instalments after a certain amount of work is done?—Yes; rery often in good years we require n man to show that he has found water. He digs a well out of his own resources and if he finds water we give him money to build up the well.
- 87. Q. You would not give him money to dig a trial shuft !-- Yes; if there is no doubt ebout the man's honesty.
- 38. Q. But should there be any doubt about the many you have his lend as security?— We have probably to limit the amount of money given ont, as the man may not use it in building a well end give us trouble to recover it.
- 39. Q Your doubt applies to his misappropriation and not to his scenrity?—No; there is no doubt about the security: we satisfy ourselves about that,
- 40. Q. If he applies for Rs. 200 and is paid Rs. 50 as first is stellment and then after inspecting his work you pay the rest, would that not be u check against misappropriation at least to a great extent?—Mr. Muir-Mackentie. I think that is dono.

- 41. Q. (Mr. Ibbetson). You have get no rock for dig Mr. Stewart. ging wells in the Pauch Mohals?—Vory little.
- 42. Q. How can a man dig a woll before you give him 14 Dec. 01. an advance?—It is not obsolutely necessary for him to dig a well. The As-istont Collector goes round and if the man chows that he is actually working on the well, he gots an advance.
  - 43. Q. His bond fide is accertained ?-Yes.
- 44. Q. Do you think that for want of time to make such enquiries a large number of people who were bond fide desirous of digging wells did not get advances?—Yes; the Mamlatdar has to make enquiries on the spot and he soldem Mamiater has to make engilies on the spot and he soldem travels with as much energy as he should for the purpose. I am afraid there is e great deal in the complaint that the people don't get the full amount of takavi from the Mimbitdar's office. I do not think there is much doubt that eome of the money sticks. An Assistant Collector should go round and satisfy himself on the spot and pay the money himself.
- 45. Q. You cannot cheek the leokage P-Ne, the man goes to the office, and applies for the money, giving a rapec or so to somebody. It is difficult to stop it.
- 46. Q. (Mr. Muir-Mackenzie).—You think the best way to protect this district against famine in the future is by extending the number of wells as largely as possible in Nasik f—It would be every good thing io Nasik; they are easily made with very little labour and will be valuable in times of famine. Alany were built in 1876-77 and were not used for years; they were cleared out and used again in the last famine.
- 47. Q. Would it be attractive to the people to give them grants for the construction of wells and to charge them only bagait assessment in the land actually irrigated under the wells? Would you favour that proposal?—I do not think it would be populor.
- 48. Q. Give the men possession of the well and merely fix an assessment on the irrigation?—I have never seen it tried or consulted cultivators about it.
  - 49. Q. Would you object to it being tried?-No.
- 50. Q. (Mr. Ibbetson).—Are wells of any use as famine works P-I have never tried it myself, it was suggested by some one last year.
- 51. Q. (Mr. Muir-Mackenzie).—They did dig trial shafts !—That was all that was tried.
- 52. Q. Would you employ famino labour on woll work?—No, I do not think famino lobour is good for that kind of work; we give the people takavi and allow thom to do the work themselves. We did that in Nasik in some villages in 1895-97. The people not only started works, but they kept village labourers employed.
  - 53. Q. Did they cultivate overything ?-Yes.
- 54. Q. Do you think meny people would be inclined to do that ?-I do not know; I am rather doubtful about it.
- 55. Q. Why?—Because somotimes they fix sites for wells and don't find water.
- 56. Q. You might advance a small sum of monoy for a trial shaft; you could risk that?—Yes.
- 57. Q. My point of view is not so much the matter of employing famine labour as to derive some means for the protection of the country against famine? Would you have therement construct wells?—At present I would not.
- 58. Q. Do you think that Mr. Simcox'e estimate of Rs. 250 for the construction of a well is correct ?—Yes, it is very fair.
- 59. Q. What would it cost to make a well through the Public Works Department?—I do not think it would cost more than Rs. 300.
- 60. Q. You would not advocate Government constructing wells?—I would rather see the people do it themselves.
- 61. Q. If there were Government wells do you think people would take water?—Yos.
- 62. Q. We have cases of people allowing their wells to fall into disuse; there would be some fear that in ordinary years they would not take weter?—We could take an agreement that the assessmoot will be paid whether the well is used or not.
- 63. Q. In that case you are sure they will take water.

  At any rate you agree that it is worth while trying ?-
- 64. Q. Would you profer tank work to anything clso for famino labour !- Yes. I think it is easier to supervise;

Mr. Stewart, you can manage it better, but there is always the danger of discuso breaking ont.

· 14 Dec. 01.

- 65. Q. There is not the same danger on read worke?—No, the people are a great deel more scattered on read works.
- 66. Q. A tank may possibly be of service, bot some roads cannot possibly be of any nec?—Yes, some of the roads constrooted by famine labour are of no ase.
- 67. Q. Tanks may possibly be of some use?—Undoubtedly.
- '68. Q. (Mr. Ibbetson).—It has been suggested that where takavi has been given to make a well and the man has been much to get water it should he remitted; what do you think of that?—I think it would he only fair to remit.
- 69. Q. Would there be any practical difficulty in finding ont how much a men has spent on the work?—I don't think so; a panch could generally fix what has been spent.

# WITNESS No. 45-Ma. DHONDO SHAMMAO GARDD, Pleeder, Dhulia.

# Answers to printed questions.

#### A .- GENERAL

Mr. Garud.

The answere given below refer to the Dhnlia and Chalisgaon talukus of the Khandesh district and the Malogeon taluka of the Nasik district. I am the proprietor of more than 1,200 acres of land in the aggregate in the Chalisgaon and Dhulia talakus of the Khandesh district and am the Jagirdar of Chendaupuri in the Malegaon taluka of the Masik district.

2. The average rainfall in each month of the year in the Malegaon, Chalisgaon and Dhalia talakas is as under:—

Name of Taluks.	May.	Jano.	July.	Angust.	Beptembor.	October.	November.	December.	January.	February.	March.	April.	Total.
Majegaon Challsgaon Dhulla	0-71	6-42	5 29	8.82	7.13	2·61 3 67 1·80	*38	199	11	-14	0.3		21·41 29 70 12·36

- 3. (1) No.
- (2) There has been gradual decrease of cattle since the introduction of the Forest Laws; and the number is much reduced by the famine of 1900.
  - (3) Same as above; dae to same reasons.
  - (4) No.
  - (5) No; except in yoars of famine or drought.
- (6) Yes; there is lack of capital for raising expensive irrigated crops.
  - (7) Not that I am aware of.
- (8) Up to the passing of the Land Revenue Code Amendment Act there was no uncertainty. People believed that the rights enjoyed by them were scene. Since the passing of the Land Revenue Code Amendment Act this faith in the stability of their tonure has been considerably sheken. They are inclined to imagine that at any time their vested rights might be interfered with.
  - (9) Aïl.
- 5. Loans are not freely taken by the people for tho extension of irrigation because Government officers feel that the responsibility of recovering the loans lies upon them; and they therefore take great deal of time in completing their inquiries; and even then recommend only persons of well-known solvent circumstances. The rayate are also chary of taking these loans because their pnactual re-payment is rigidly enforced; and very often the rayat is obliged to

- borrow money from sowcers to repay over-dao instalments of tagai loans.
- (1) I would recommend the reduction of the rate of interest to Rs. 4 per cent. per annum.
  - (2) No.
  - (3) No.
- (4) I would recommend tolal remission in case of failure, of the attempt to obtain water.
- (5) The rules under the Land Improvement Leans Act (XIX of 1883) are sufficiently liberal. What is wanted is that they should be carried out in the same liberal spirit. It would recommend that in seasons of famine or searcity, repayment of instalments of tagai loans should generally be suspended.
- 6. I am not in favour of grants-in-aid.
- (1) No.
- (2) Owing to the frequency of famine in recent years the desire for having means of irrigation as a measure of protection has increased; thus in good season irrigation from wells is not much availed of.

#### E .- WELLS.

- 34. The average depth of permacent wells is 30 feet. Water is generally supplied by springs. It is liable to fail in seasons of drought only. Average cost of construction is Rs. 400 with two mots. With ordinary repairs a well will lust more than 40 years. Water is usually raised by mots.
- (6) The average area attached to and commanded by a well is 4 ecres.
- (7) The average area irrigated in any one year is 2 acres
- 38. (1) Yes. Very often attempts to ohtain-water are unsuccessfol.
- (2) Generally no serious difficulties are experienced in the actual construction of wells, but professional advice would be of value.

Never to my knowledge.

- It would decidedly be aseful to provide expert advice, make trial horings and supply being tools to ascertain the sapply of sabsoil water. It is desirable to have a specially trained establishment for this porpose.
  - 39. No.
- 40. Very rarely. For the year in which they are dog they are a protection against drought. In a year of scaaty rainfall tagai should be given for digging wells.
- 1. Q (The President).—Are you a resident of Dhulia ?
  —Yes.
  - 2. Q. I suppose you know Klandesh very well?-Yes,
  - 3. Q. You were here during the last famino ?-Yes.
- 4. Q. What do you think would be the most suitable steps to take to better eneme Kbeudesh against another femino than it was this time?—I would recommend encouragement in the increase of making tanks and wells.
- 5. Q. What tanks do you mean, large or small?—Small tanks which would he completed during the year, not large ones which cannot he completed and used for years.
- 6. Q. You mean tanks adjoining villages P—Ycs, those tanks which would raise the water level of, wells adjoining them and would give protection to people in time of famine.
- 7. Q. What would the people grow under them, would they grow rice?—Wheat end other crops.

- 8. Q. In the beds of the tanks ?- Yes.
- 9. Q. Yoo don't think they would grow anything under the embankments of the tanks ?—If there is water in the tanks, then they would grow rice, wheat and other crops.
- 10. Q. They woold hardly grow wheat in the monsoon?
  -Wheat is grown in the cold weather.
- 11. Q. Could that not be tried in a year of drought? .-One or two waterings would be quite sufficient for wheat.
- 12. Q. You say "leans are not freely taken by the people for the extension of irrigation; because Government officers feel that the responsibility of recovering the leans lies upon them—and therefore recommend only persons of well-known solvent circumstances"?—I mean solvent within the knowledge of the Memlatdar; there may be other people solvent, but they may not be known to the Mamlatdar.

- 13. Q. What do you propose?—I propose that a man who has no mortgages on his land may be given takavi upon the security of his land.
- 14. Q. Could a man very easily prove that he has no mortgages?—The Mamlatdar can setisfy himself from the village officers; the Patels know whether a man has mortgaged his land or not.
- 15. Q. How long does it toke generally to get takevi advances?—A long time generally; they have first to make applications to the Mamintdar, who sends them to the village officers to make inquiries.
- 16. Q. How long does it take altogether?—I should Mr. Garud. think it takes more than six months.
- 17. Q. Do you think that, if the interest was reduced 14 Dec. 01. to .4 per cent. from 5 per cent, it would make much difference?—It would make repayment more easy.
- 18. Q. Would you recommend that Government should lend mousy without interest at all?—No; Government are taking a low rate of interest elrendy.
- 19. Q. Do you consider the bandhara system, us practised in these provinces, is a good system!—Yes, it gives water to the nearest village for drinking purposes and irrigation.

# TWENTY-SECOND DAY.

# Poona, 18th December 1901.

WITNESS No. 46 .- Mr. C. N. CLIFTON, Superintending Engineer, C. D.

Answers to printed questions.

#### A .- GENERAL.

- 1. The Collectorates of Poous, Ahmednagar, Sholdpur, Kasik and Khandesh, but more especially to Poone, which is my head-quarters, and in which district the two principal irrigation works are situated. I was formerly Assiscipal irrigation works are situated. I was formerly Assistant Engineer in the Pooun Irrigation District and the Fire Caual (then a separate churgo) from 1880 to 1880, but principally on construction work. Lately I have been Superintending Engineer, Central Division, but my work includes, in addition to the irrigation, all the Provincial and Local Fand works in the Division as well as the Military works in all Military Stations except Poone and Kirkes and Davláli. I have else, during the tenure of my office, bed extensive famine works in my Division.
- 2. This information will be given in the reports for each district.
  - 3. (1) I do not think it so.
- (2) Not as an ordinary rule, I believe. There may be difficulty now in obtaining cattle for ordinary egriculture owing to lesses during the famine, but the irrigated area io not very extensive, and there should be no difficulty in getting a suitable supply of cattle even for extended irriga-
- (3) I think there is no great scarcity of munure, as far as I can learn.
- (4) There are obstacles to irrigation in block-soil in so far as the oultivators are not willing, and as a rule do not require water to irrigate black-soil for food-crops. Where water facilities are available, however, they are very willing to extend irrigotion to black-soil for sugarcans and other valuable crops.
- (5) There are obstacles in some cases owing to uncertainty of supply of water and its too lete commoncament or early cessation.
- (6) I do not think that feer of cubanced rate or revenue assessment is an obstacle. The people are well ecquainted with the rales and rotes of water, at all events where there is only crop rate cherged. There may possibly be such fear in cases of loads where consolidated rate is charged, but I am unuble to speak definitely on this point.
- 6. I do not think so. Yes. In Khándesh and Násik, where people with louds nuder bándháras are constantly petitioning for storage works and improvements. The Chankapar Tunk is a particular case in point. I think, generally speaking, that there is a desire among the people to have means of irriention extended as increased. to have means of irrigation extended or increased.

## B .- CANALS OF CONTINUOUS PLOW.

- 7. (1) It is not a general rule and in fact I bolieve very exceptional to hove two harvests. The people are not enterprising eneugh, and there would possibly be difficulty in obtaining enough manner.
- (2) There is always o tendency to increase the urea of sugor cone garden and other valuable erops where water is available.
- 9. The average rate per acre poid in the form of a crop rate is given in Statement G of the Irrigation Revenue Report of the Bembay Presidency. Statement I-F giving water-rates in force on the different works.

- (2) For ordinary cultivation roughly Rs. 4 per sore, for Mr. Clifton. sugarcane as much as Rs. 20.
  - (8) Noue.

# 18 Dec. 01.

Above rates are paid on area actually irrigated.

# C .- CANALS OF INTERMITTENT PLOW.

Those enestions will be answered by the officers of the various districts. I have not the time at my disposal to describe the conditions of the different works in my five districts.

# D.-TANES.

By this, I presume, are meant village tanks, of which there are few or none in this division.

34. This information will be sent by the officers of the 34. This information will be sent by the officers of the various districts. As my charge comprises an area of 32,000 equare miles, it would be impossible for me to give information as required for each of the main treets. A reference might be mode to a report on the best means of oncouraging the extension of well irrigation by Mr. F. D. Campbell, C. E., circulated with Government Resolution No. 448 C.W.—1059 of 23rd June 1885.

## II.

2. There is ordinarily a demand for water in the Deccan during the south-west mensoon for perennial and valuable crops, but not as a rule for cereals or food-grains. These latter given good rainfall come to maturity without artificial watering, and the cultivators refrain from applying for water. The crops that require irrigation number of waterings, etc., are in the Poona District as under:—

Class of Crops,	Period.	Numb of waterin	_
I. Persunial— (Sugarcano, garden crops, Pán, etc.).	All the year round .	25 to	85
2. 8 months— {Potatoes, sweet-peta- toes, ground-nets, ohillies, onions, gar- lies, etc.).	July to Fobruary .	15 to	20
3. Monsoon, dry— (Jowari, Bajri, Tur, Mug, etc.).	July to October .	2 to	6
4. Monsoon, wot— (Rice, wheat, etc.)	July to October .	4 to	8
5. Rabi— (Jowári, gram, wheat, oto.).	October to February.	3 to	6
6. Hat-weather— (Fodder, etc.)	April to June	6 to	, 2

Mr. Clifton. 18 Dec. 01.

The distribution is controlled by Departmental sobordinates with suitable staff of Inspectors, Patkaries, otc.; also measurers where crop rates are lovied. The irrigatism revenue is for the most part, realized in the shape of nerop rate. In the east of the 2nd class works in Nasik and Khadesh, in the form of consolidated rate.

3. Black-soil is not in my opinion saitable for tank embankments. The usual practice in tank dams in this Precidency is to have a portion of the interior of the dem to consist of a hearting made of mixture of black-soil nod maram or sand.

Massary core walls have not been used to my knowledge. Where the laud irrigated is hlack-sail, it is not found that there is much demand for water for monsoon erops in a year of average rainfall. Where, however, there are facilities for irrigation, there is always demand for water for sagarcane and garden crops on hlack-soil land. In case of proloaged drought, there is of consee demand for water. In such soils although there may be a falling off in the irriguled area in a good season, atill it is difficult to estimate, as io bad seasons the area irrigated may be limited by scarcity of water in the tanks or canals. In any case the revenue is not much affected, as it depends more on the quantity of cogarcane and valeable crops irrigated. There is a desire for irrigation works on the part of owners of is a desire for irrigation works on the part of owners of black-soil, but it is for the cultivators of sugarcane, ots., and not for monsoon crops.

5. There are no Provincial Irrigation Works in my

charge.
6. There are very few of these and very little information at my disposal. Such tanks are assent for men and cattle and to keep the sub-soil water at a high level.

I understand that in the Poona

cattle and to keep the sub-soil water at a high level.

7. Many wells ran dry. I understand that in the Poona District alone only 25 per cent. of the wells (oxcluding those under the influence of canals and tanks) were worked during the late famine. Average depths of wells in the Decean may be said to be from 30 feet to 40 feet and a good well costs from Rs. 1,000 to Rs. 1,500. Kacheba wells are from 15 feet to 25 feet and cost from ks. 100 to Rs. 500. They are usually what are called "Burkis" at the sides of nalis or near canals. The ordinary acreage served by a well is as under: served by a well is as under :-

For sogarcane from two to three ncres. For fruit-trees from four to five acres. For food-grains from six to seven seves.

8. There are practically no lands or crops injured by water-logging. The irrigation on this part of the Presidency is not on a sufficiently large scale to cause such, and the general conformity of the esantry does not lead itself to it either. There was at one time a certain amount of water-logging near Poons where extensive irrigation of sugarcane exists, but this has been lessened by more careful rotation and distribution of the water. No drainage works are nired. works required.

9. A statement is nttacked showing classification of the works on which relief labour was employed daring the late famiac.

The nncompleted works which I consider it desirable to complete as a charge against Imperial Revenue are as

Nasik District—1 Waghad Tank. Ahmednagar District—3 Maladevi Tank.

3 Ojhar Right Bank Canal and Musalwadi Tank,

4 Visapur Tank. Khándesh District—5 Chánkápur Tank. Poona Irrigation-6 Shotphal Tank.
7 Victoria Tunk at Warwaud. Saolapur District-9 Pathri Tank.

9 Wadshivaan Tank.

Of these No. 6, the Shetphal Tank, is already being completed as a Protective Work. It is to be filled from the Nfra Canal daring the monsoon and will serve a large tract of country near the tail of the Nfra Canal. The Maladevi Tank (No. 2) is fanoarably situated in a Ghunt District, and will provide storage for the existing Likh Canal and Olihar List Bank Canal and for the New Olihar Right Bank Canal (No. 3) which depends on the completion of the Maladevi Tank for its supply. The Musalwadi Tank is a Starago Tank to be filled from the Olihar Right Bank Canal daring the monsoon. As before said, the question of completion the monsoon. As hefore said, the question of completing these two works depends on the Muládevi Tunk being completed. It will be a very valuable protective work. The same remark applies to Chánkápar (No. 51 and Wöghad (No. 1). These are respectively Storage Tanks to supplemeat the supply to the various Landharas on the Girns and Kudwa River, and to extead the irrigation of the tracts of country below them, and being both in Ghaut Districts are likely to he very valuable Protective Works. The Weighad Tank classed as a productive work is nearly completed. The Viespur Tank (No. 4) in the Ahmedingar District has a large catelment area and is situated in a part of the country where irrigation is hadly wanted; although it is doubtful whether the tank will fill regularly, till as it will probably pay its working exposes, it might be considered. The same romark applies to the Warwand Victoria) Tank (No. 7) in the Poona District which will serve to irrigute 3,000 acres of rabi crops. As regards the Pathri Tank (No. 8) and Wadshivann Tank (No. 9) in Sholapur, they ere well on to esmpletion, and it would be a pity not to snish them, especially Pathri which is intended ultimately to supply the important mercantile centro of Bursi with water. The other large tank works commenced as famino relief works in Sholapur and elsowhere, I would leave as they are to be continued if required in the future as famino works. They are in rainless tracts and would he of little protective value as in years of drought they would not fill. This is the experience gained from the Ekrak, Mhoswad, Ashti and other tanks in the eastern portion of the Sholapar, Poona and Khaudesh Collectorates. The Odal Tank in Nasik and Parmapada Tank in Khšadesh nee intended ts feed bandbaras lower down the river on which they are situated, and even though they did not fill nre intended to feed bandbaras lower down the river on are intended is teed oansaaras lower down the river on which they are situated, and even though they did not fill would supplement the water-upply to the existing irrigation, so that there is perhaps more to be said in their favoor than in that of the others from which canals have to be taken.

taken.

13. It is difficult to give a scale of water rates for the whole of my Division which is over 32,000 square miles in extent. These water rates vary on different works and are senetioned and modified from time to time. Statement I-F, bowever, of the Irrigation Revenus Report of the Bendoy Presideacy, exclading Sind, gives statement of water rates per are in force on irrigation works. Distribution is controlled by especial establishment varying with the different conditions and requirements, and there is no general system or ratio of establishment to area irrigated or longth of canal or anything of that kind. Tanks are generally ompty or nearly so at the end of the irrigating seasan. The exceptions are the Khadak-Wasla (Lake Fife) and Ekrak Tank, in which case water has to be bushanded for the supply of water to Poona and Sholipor, respectively. Otherwise they would also be empty, every available drop of water being need for irrigation. Irrigation works get no eredit for increase of revenue dae to their construction, the revenue being limited to amount realized as water rate. The charges for maintenance and establishment are in some cases exaggerated by reason of the same establishment being emcharges for maintenance and establishment are in some cases exaggerated by reason of the same establishment being employed on civil works. For instance, Ahmednagar and Nésik are Imperial Irrigation Divisions, though the bulk of the work there, is other than irrigation and the irrigation works there are looked after along with roads, buildings and other public works, and in the case of Ahmednagar extensive Military Works by the Executive Engineer of the district. Sholdpor, on the other band, a neighbouring district to Ahmednagar, is a provincial charge, though the irrigation works are about four times as extensive as these in Ahmednagar. Still the mainlenance costs more than the revenue' management on every work in Sholdpar, while an exact. nagar. Still the mainlenance costs more than the revenue management on every work in Sholápar, while an exactly opposite state of things exists in Ahmedaagar. The proportion of working expenses to capital outlay as a little over a per cent. in Sholápar, while it is nearly 4 per cent. in Ahmedaagar. The Revenae Accounts of such large works as the Matha and Mira Canals may be taken as fairly accurate and indicating the financial results obtained.

. 14. I consider the protective value of irrigation works in the Decean very limited. The Mrs and Mutha are good works (though the Mutha is not classed as protective) as they have Ghant eatehments, but the tanks in the eastern part of the Division where the minfall is precarious can be said to have little or no protective value. If the minfall hoppens to be good and the tanks fil, it is quite probable that water may not be freely availed of and if the mins full the tanks do not fill. Even this year after a moderately good minfall the Mhaswad Tank, a tank classed to protective with an enormous eatchment, did not fill, the full anpply level being some ten feet below the crest of wester. Funding relief was certainly required in many of the villages a ominally protected by these tanks. I am unable to give any estimate of the extent to which the cost of faming relief would have been laserased, if these works had not been in operation. There was, however, no don't neconsiderable saving in the portion of the Poona District from the fact of the Nim Canal being in operation. of the Division where the minfall is precarious can be

- 1. Q. (The President.)-You ore Superintending Engineer of the Central Division !- Yes.
- 2. Q. How long have you held that position f-Two years.
- 3. Q. What has been your previous experience of irrigation?—I was in Sindh and on the Mutha and Nira causls some years ago, bot principally on construction. I have not had much experience of irrigation details in the Deccan.

- 1. Q. Did you ever have the administration of a canal as Executive Engineer?—Yes, in Sindh.

  5. Q. Engiocers have not much to do with administration there, it is in the haods of civil officers?—Yes; the revence administration. The clearance and repairs, etc., of canals are in the haods of the Public Worke Depart-
- ment.
  6. Q. Ie the rabi crop largely irrigated anywhere in the Deccan: —A good deal from wells, I think, and on canals where they exist.
- 7. Q. Do ther irrigate juari?—Yos; I have seen como irrigated from the Nira Canal.
  - S. Q. And wheat ?- Yes.
- 9. Q. You say in paragraph 3 of your memorandum, "Nack-soil is not io my opinioo suitable for tank embonkments. The usual practice in tank dams in this Presidency is to hove a portion of the interior of the dam to consist of a hearting made of a mixture of black-soil and muram or sand". I emphso the fact of its being black-soil country would not provent a dam being made if it was necessary." eesary ?-No.
- 10. Q. Have you seen much irrigation in black cotton soil?—I have not had much time since I have been here to go into details.
- 11. Q. Are you aware that it is very etrougly asserted that black cotton coil won't take irrigation?—Yes, I have heard it.
- 12. Q. You say in paragraph 9, "the uncompleted work which I coorder it desirable to complete as a charge against Imperial Revenue are as nuder; Nasik District (1) Waghad Tank." What is the stote of that tack?—It is nearly completed; it once failed and it was reconstructed. The object is to furnish water for improving the Pollshad and Value. is to furnish water for improving the Palkhed and Kadvo Canal systems.
- 13. Q. You say the work is going on ?—Yes, the waste weir has not yet been finished; the finel project will be sent to Government very chortly; it has been sent back for come alterations and will be resubmitted.
- 14. Q. Has it ever been before the Government of India ?—No, only before the Local Government. This refers to present proposale for completion.
- 15. Q. (Mr. Higham.)—Will the estimate go to the Government of India ?—I don't think so, ucless there is an excess over original estimate.
- 16. Q. (The President.)—You recommend it should go shead, and not be kept as a means of employing famios labour ?-Yes. It is going on.
- 17. Q. You mention noxt the Moledevi Tonk; what is the state of affairs there?-A good deal of the puddle trench has been done and the waste weir. It is the storego reservoir of the Pravari system that has been going on for the last two years as a famine relief work.
- 18. Q. (Mr. Muir-Mackenzic.)—Very little work hos been done on the tank; most of it has been on the canal?—The waste weir and part of the puddle trench has been dono.
- 19. Q. A great deal has been done on the conal?-Tho Ojhar Kight Bank oncol has been completed except for the masonry works. There is no canal direct from the reservoir.
- 20. Q. (The President.)-The masonry works are not yet sanotioned ?-No.
- 21. Q. Havo designs gone in ?—An estimate has gone in, I don't thick it has heen approved; most of these famine works have heen going ou on rough estimates; I have not had time to complete projects.
- 22. Q. Whot are the best works to ficish at once so as to obtain an early return upon what has alreedy boon spent?

  —The Potri and Wodshivno in Sholopur; they are rain-fed tanks; the Wagbad the only one which is nearly completed. The others are only just begun.
- 23. Q. Has the Shetphal Tonk no catchment of its own ? -No, it is to be filled from the Nim Canal.
- 24. Q. In what stoto is it new?-Most of the earthwork is completed; it has already some water in it.

25. Q. Will it be ready for the next mensoon?—Yes, I Mr. Clifton. thick so, we can fill it up as we like; the upper part of the dam has to be finished.

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- 26. Q. (Mr. Higham.)—You can fill it every year?—Yes, the water of the canal is not much used in the monsoons, we have one tank on the Mutho Conal of the same kind, the Matoba tank, and have found it very useful.
- 27. Q. (The President.)—What stage is the Khamgaon tank in P—It has been partly carried out hat it is not a work that we can fill under present circumstances. The difficulty is that we cannot put the whole calculated discharge of 400 cusees through the tunnel.
- 23. Q. Is that on account of the water-supply of Poona?

  —Yee. The Poono tunnels just helow the pomping station and if more than 200 feet per second he passed down the water is headed back and the wheel stops.
- 29. Q. Ie the extension of irrigation retaided by this? Yes, it is impossible to widen the present thonel; we cannot close it; another tunnol could he mode.
- 30. Q. Howlong is it?—About this of a mile through rock.
- 31. Q. The neck of your bottle is, you may say, throted?

   Yes, we could pass it down but for the water wheel.

  It is an ordinary Poncelet wheel. Mr. Visvesvaraya is considering a project for improving motiors.
- 32. Q. (Mr. Muir-Mackenzie.)—Why was the tank made if it is impossible to fill it?—As a famine work there was no better work evailable. With good roins it may fill.
- 33. Q. Would there he any difficulty in substituting some other kind of wheel to get over the difficulty to which you refer?-No, I think not, bat Mr. Visvesvaraya has the questioo under coosideration.
- 34. Q. The project for the Khamgaon Tank was got up long one but it was rejected as the foundations were not considered suitable?—Mr. Visvesvaraya found a new site and it was sanctioned.
- 35. Q. It was reelly sanctioned as a famine work for want of something better?—Yes, like the Warwood tank.
- S6. Q. If these questione had been 'considered years ago and estimates prepared carefully, it would not have been necessary to do these works in a lurry P—No.
- 37. Q. You say in your note, "the other large tank works commenced os famine relief works in Sholopur and elsewhere I would leave as they are, to be continued if required in the future as famine works. They are in rainless tracts and would be of little protective volue, as in years of drought they would not fill. This is the experience gained from the Ekruk, Mbaewad, Ashti and other tanks in the eastern portion of the Sholapor, Poons and Khandesh Collectorates." Is there only means of connecting the Ekruk, Mhaswad and Ashti with the hills with a view to storage?—I don't think
- 38. Q. Does the Mhaswad not fill?-It is in the north of Sholapur and has 480 square miles of catchment, but it is in quito a rainless tract; you may got the heavy Madras monsoons, but that is quite nucertain
- 39. Q. And the Ashti ?-That is also in a very minless fraet.
- 40. Q. Is it possible to get anything from the Bhima river fute the tanke?—No, the bed is so low.
- 41. Q. (The President.)—You say in your note," tanks are generally empty or nearly so at the end of the irrigating eason. The exceptions are the Khadak Wesla Lake (Lake Fife) and Ekruk Tank?—Yes, the Khadak Wasla is for the Poons water-supply and the Ekruk supplies Sholapar; we reserve the water for the towns, otherwise they too would be empty.
- 42. Q. Do you understand the principle on which come districts are classed Imperial and some Provincial ?—No; there are many anomalies; the Sholapur district, for instance, is Provincial, and it has a lorger area of irrigation then the Ahmeduagar and Nasik districts which are Imperiol.
- 43. Q. (Mr. Higham.)—As regorde these works on the Kadva river, the Waghad tanks, etc., I see that according to the estimate that was submitted when they were constructed they were estimated to irrigate about 8,000 acres; the actual area is about 2,500 acres only. Can you say what was the reason why they fell so far short of the estimate?—No, except that the waste wen has not been raised to its proper height and therefore the Waghad tank does not hold the foll about the desired or pale. calculated supply.

- Mr. Clifton.
- Mr. Clifton. 44. Q. I am referring to oll the works on the Kadva river?—We have had a very bad series of years; the rain18 Dec. 01. fall has everywhere heen very hod.
  - 45. Q. Whot is the present state of the Waghed tank? The waste weir has not been built up to the full height.
  - 46. Q. There is nothing to prevsat that being done?—No; it is being done at present.
  - 47. Q. To what extent will that increase the storage?-I cannot soy.
  - 48. Q. You say that in your opinion black-soil fanot suitable for embankment of tanks; have there ever been any experiments to test the best kind of ingredients for doms? -I don't think so.
  - 49. Q. On the Visapur Tank you are now mixing muram with black-soil?—Yes, in the propertion of 1 in 4; it is based on test experiments made on the epot.
  - 50. Q. In the case of the Weghad Tank, what was the slip due to?—I don't know; the Ashti hauk was founded on insecure soil, which when it got wet was like liquid mud and tho hank sank into it; and at Pashan, n small tank for the Kirkee water-supply, olso we had u slip; now we ors very careful about the base.
  - 51. Q. Do you think that slipping is due to founding on black-soil and not to the quality of the hearting?-No.
    - 52. Q. You have had e good many of these slips?-Yes.
  - 53. Q. Hos there ever been a complete failure of a dam?—The Waghad was ever topped during construction; the Asthi is quite sale new and new holds water, hat not much this year owing to had rains.
  - 51. Q. What are you doing to prevent water-logging in the Poona cane area?—We are taking great precautions now; we are distributing water in rotation and Mr. Visve-varaya has taken great trouble about it; the materlegging is not serious.
  - 55. Q. Is it less now than formerly?—I cannot speak from personal knowledge, Mr. Visvosvaroya tells me that as the case.
  - 56. Q. Are there complaints of water-logging on the Nira Canal?—I haso not heard of any; the country does not lead itself to it; it is on a good slope.
  - 57. Q. Mr. Mollisnn said that it is rather serious on the Kira?—I have not heard of it, it has not come before me in any way.
  - 59. Q. You referred to the Ekruk and the experience gained, saying that these rain-fed tanks will not fill?—Not habitually.
  - 59. Q The Ekruk has always had plenty of water during the late famine f-It was very short last year.
  - 60. Q. I understand you to say that the Ekrnk would have been empty long ago but for the wunts of Shelapur? We have had to regulate its supply.
  - 61. Q. Sholapur depends on Etruk for its water-supply?
    -Yes, we have had to regulate our of crations accordingly.
  - 62. Q. The variations do not seem to have been very great on these tanks. What is the tank enphased to hold? -I cannot my offhand.
  - 63. Q. As you complete these small tanks in Sholapur what will become of them; will they be maintained by the Public Works Department?—I think so in the same way as Ashti and others.
    - 64. Q. And unter-rates will be charged ?- I think so.
  - 65. Q. I suppose these tanks are all completed ?—Only the Patri and Warduner which are nearly completed; the others are in the same stote as the tank at Visapur.
  - 66. Q. There has not been a single case of a tank in Sholapar being begun and completed as a foming work?—No, we cannot put many people on one tank owing to limited space for working.
  - 67. Q. (Mr. Ibbetson.) What are the districts in your division? Khondesh, Sholapur, Poons, Ahmedasgar, and Nasik, all the revenue districts of the Coutral Division in fact, except Satura.
  - 6S. Q. You soy in your note, "there is ordinarily a demand for water in the Decon during the south-west moosoon for perenniol and valuable crops, but not as a rule for cereals for food grains; these latter, given good rainfall, came to maturity without artificial watering." In how many years is there a good minfall in the Decon; putting the last for some next, would it he try ware set of 5.5. the last five years apart, would it be two years out of 6 ?— My recollection is that they lad good erops ordinarily with-out irrigation; I think they had a series of good years.

- 69. Q. You say "the irrigation revenue is for the most part realized in the shape of a crop rate. In the case of the second class works in Nasik and Khandseh in the form of a csusolideted rate." Do you know what proportion of of a esusolidoted rate." Do you know what proportion of that osusolidoted rate is credited to water?—I cannot say.
- 70. Q. You have no opinion as to whother the oredit in sofficient or not, you have nover thought obout it perhaps?

  No; I cannot soy; I do not think it is oxcessive.
- 71. Q. In your division have you anywhere a supply of water realishle for irrigation that is not mode use of?—Yes; on the Mhowwad Tunk we were able to supply 25 million cubic feet which was surplus to the Pandarpur Tank which is a weter-supply tank.
- 72. Q. You were ready to give that for irrigation and no one wos willing to take it?—Yes, this year and last yeor.
- 73. Q Why was the woter not taken?—I caunot soy, oxcopt possibly want of manuro and facilities for irrigation.
- 74. Q. (Mr. Muir-Mackenzie.)—Were there any complaints about the system of distribution?—I have had no complaints.
- 75. Q. Was the srea irrigated hat year as much us in previous years or the supply of water larger than usual, or was the area irrigated smaller, or do you always have a surplus? I can only speak of these two years.
  - 76. Q. Did you hove a surplus in both? -Yes.
- 77. Q. What seil do yoo irrigate from this tank ?-Black soil and reddish, I don't think there are any features in it different from other tanks.
- 78. Q. You don't think it was the soil that prevented people from using the water in larger quantities?—I do not think so; it is the ordinary soil of the Deccan, though possibly the country is more stony than elsewhere.
- 70. Q. (Mr. Ibbetson.)-You have no idea whot the
- SO. Q. Was any effort made to induce the people to use the water ?—I cannot say, the Executive Eugineer, Mr. Godbole, coald tell you.
- 81. Q.—What procedure is necessary when a man wants to take water ?—There is a printed form of application, I think the Mamlatder Issues it to village authorities or it can be obtained direct from the subordinates.
- 82. Q. To whom does the cultivator give it?-To the aphordinate.
- 83. Q. Who is the subordinate?—He is a member of the Public Works Department.
- 84. Q. What does he do with It?-He sends it to the Executive Engineer.
  - 85. Q. Then it is returned to the subordinate f-Yes.
- SO. Q. And then the autordinate lete the man know whot orders have been passed?—Yes.
- 87. Q. How long does that take ordinarily—two months f—I am afraid there is apt to be a little delor, but nothing like two months.
- 88. Q. What does it take in ordinorily ?- I cannot say.
- [With regard to a remark made by Mr. Minir-Mackenzie as to the irrigable area on the Mbaswad tank, Mr. Beale". explained that :-
  - (1) Irrigable area is that portion of the oulinrable area for which there is sufficient water available during the year ;
  - (2) Culturable area is the area noder command to which water can be led from a canal.]
- SP. Q. Did you see much of the irrigated areas during the famine f-I saw a good deal.
- 90. Q. Did you see anything of the wells near canals and tanks; was much good done by them ?--Yes.
- 91. Q. Po you think they were substantially better off than wells ut n distance?—You.
- 92. Q. In restricting the water-apply in Paona and armaging for distribution, have you had any trouble with the people?—No, I understand not, I have personally had very few complaints, Mr. Visvesvaraya is I believe getting the system into very satisfactory working order.
- 103. Q. You say in your note, "In Khandesh and Nasik people with lauds under Lhandards are constantly petitioning for starage works and improvements." Do you thick there is any scope for that?—The Maladari and Chankapur tanks are protective works for those districts.
- 91. Q. There are two instances of what is possible ; has a general survey been made of the sountry to show what

- is possible and what not ?—Investigations have been going on for years and are still in progress.
- 95. Q. You know what is possible ?—Yes, most of the possible sites have been investigated but details have not in all cases been worked out.
- 96. Q. Is much more possible basides those two tnuks is there any schome for the improvement of the bandhard system?—I don't knew if any general scheme is in haud bat improvements are made from time to time as found desirable.
- 97. Q. Have you got all that is possible under consideration, or is there pleaty of room for more ?—I think what has been done pretty well exhausts the means of improvement so far as I know.
- 98. Q. De you know Khaudesh?—Not as well as the other districts.
- 99. Q. (Mr. Rejaratna Mdlr.)—If there is delay in getting sanotion to applientions for water and the rayat irrigates his land before the recoipt of sanction, is he subjected to a penalty f—There is a double rate for taking water without permission.
- 100. Q. (The President.)—You don't require permission every season?—Yes.
- 101. Q. (Mr. Rojarotna Mdlr.)—Is such annual application necessary, do you think ?—Yes.
- 102. Q. Why ?-Because of the varying conditions of the sources of supply.
- 103. Q. I suppose you knew the enpacity of the tank and the area generally irrigated P—If you could depend upon the tank always baving the same contents. One year you can accept a larger number of applicants then another, necording to your supply.
- 101. Q. But taking normal years, why should you wish to have applications overy year?—You get on idea of who is going to take water.
- 105. Q. Would it not be simpler to same the water without fresh applications ?—I don't think it would simplify the procedure very much.
- 106. Q. (Mr. Muir-Mackenzie).—At what date bave applications to be received ?—16th October for rabi and 16th Jane for kharif, I thluk.
- 107. Q. (Mr. Ibbetson.)—In there my date after which a men cannot get water, if he is ready to take it ?—I cannot say. It depends on the anpply.
- 103. Q. (Mr. Rajaratna Male.)—Would it not be eimpler if you had no annual applications ?—I don't know how it would work; if you have your calculations on a normal year and have a had year there will be complications.
- . 109. Q. You say in paragraph 13," the charges for maintenance and establishment are in some cases exaggerated by renson of the same establishment being employed on civil works." Is not the charge for establishment apportioned according to the amount expended P I don't know how the charges are made up.
- , 110. Q. There must be some rule on the subject ?—Yes no doubt.
- 111. Q. (Mr. Ibbetson.)—You said just now that, as far as you know, no special effort had been made to induce the people to take the 25 million cubic feet of water that was surplus in the Mhaswad tank; was the Executive Engineer asked for any explanation why this water was not used in a year of drought?—There was some correspondence with Government; the Executive Engineer cave certain reasons. I forget what they were; Government then sanctioned giving the water to the tank.
- 112 Q. I suppose the Executive Engineer interested himself in trying to got this water used and you as Super-intending Engineer called upon him to explain why the water was going naused?—We have been so busy with the fourluo that there has been very little time for other matters.
- 113. Q. (Mr. Muir-Mackenzie.).—Do you think thet famine labour has been employed as advantageously as it might possibly have been ?—I think so.
- 114. Q. It has been employed on metal breaking?
  —Yes, but we have had to people as much on earthworks as possible; we had to begin with metal rock.
- 115. Q. Why?—Becouse estimates were not really and there was a difficulty in starting other works.
- 116. Q. If estimates had been ready for other work you would have preferred the labour to be employed on them?

  —Yes, for instance railway works and tanks.

- . 117. Q. Is there anything you prefer to see famine Mr. Clifton. labour on rather than tanks, in the special circumstances of your division?—No, I don't think so.

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- 118. Q. Roads might be more advantageously made in Khandesh?—There is the difficulty of keeping up roads case they are made, I thought of tals or terracing on a large scale at one time, but we had not the establishment. A good deal of this is done by means of takavi advances.
- 119. Q. What is the great objection to terracing?—The difficulty of supervision and about huts and camps; we were hempered by rales about hatting, hespital, etc.
- 120. Q. It would be difficult to make requisite urrangements for large nambers ?—Yes.
- 121. Q. Do you consider those difficulties in superable?—I don't think so; if the question was thought out beforehand I think it might be possible to arrange; digging wells is out of the question, they don't give may work for carriers. I containly think torracing might be tried, it is n very useful work.
- 122. Q. There would be no difficulty on the part of the cultivators in ellowing it to be done?—That is a matter I have not considered, I don't think so.
- 123. Q. They don't make may difficulty about year taking land for bunds ?-No.
- 124. Q. Is the extra expense in addition to that isourred on famine inboar necessary to complete the taaks very heavy?—No. I may say that these taaks are excellent furniae works, at the same time I prefer tals to tanks; we had to consider the question last year; tank sites are very limited now and we have exploited most of them; it is doubtful if we could go much further in this direction; small village tanks have not been tried to any extent and something more might be done in this respect.
- 125. Q. I understood from what you said that the selection of some of these tanks was due probably to the fact that there was no time for full consideration of all the conditions?—Yes.
- 126. Q. There was no time to consider if the tank was one that weald he likely to fill—One had to start work of some kind; the Hotgi, for instance, was one started under such chromatanees.
- 127. Q. How would you remedy this state of things in a fature famine?—I should have a special establishment to proper projects; the Excentive Eagineer cannot do it in addition to his own work.
- 128. Q. You have programmes?—Only for metal breaking and reads, oto., and a few tank works.
- 129. Q. Should not the programme be of works of which the plans and estimates are fully sanctioned?—We have a good many projects not absolutely rendy.
- 130. Q. Deu't you think it would be a good thing to heve them absolutely ready?—We should have a special estab. lishment to propare them.
- 131. Q. You think the best method is to have a special catablishment?—Undoubtedly, there is no question about that.
- 132. Q Have you been lately in the neighbourhood of the Nira Canal works ?—Yes, a fortnight ago.
- 183. Q. Can you say from the appearance of the country the villages and caltivation, if there is a muterial increase in the presperity of the tract?—Yes, most certainly, in the nhundance of the crops and the appearance of the people and overything clso.
- 134. Q. Did you happen to observe the yield of the crops; bew does it compare with the yield on unirrigated crops in a year of good rainfall; do you think it is superior?—I should think it is superior; the bajra and juar are bigher, but it is a long time since there has been normal rainfall.
- 135. Q. Is manne being used for grain and fodder crops?—I should think that where there is sugarcant they probably took agest of the manuro for that.
- 136. Q. That would probably exhaust the supply ?— Yes.
- 137. Q. Coming to the question of applications; I suppose one tesson for requiring applications is that in the case of a canal with a limited supply you must know the number of people who want it is urder to be sure that the water is sufficient?—Yes.
- 138. Q. In the Massad tanks we have a case of the supply not being taken up; why didn't you dispease with applications in that case?—No doubt it might have been

Mr. Clifton. useful but was not thought of; I don't think it would do

as a general principle for these works.

18 Dec. 01. 139 O I the ever when we have a truly from which

- 139. Q. In the case where you have a tank from which the people don't readily take up the water that is to be had, don't you think it might be advisable to dispense with applications?—Yes, I think it might be tried.
- 140. Q. I suppose it is certain that this supply was given to the Pandarpur tank on this account?—I think it was simply enrylns; we had to get the permission of Govern-
  - 141. Q. You cannot recall the reasone?-No.
- 142. Q. Has it over occurred to you that the present system of distributing the water of a canal is ensceptible of any material improvement, or are you satisfied with the system?—I think so at present, Mr. Visveevaraya has laid oot in the rules all the improvements which I think are
- 143. Q. As to the crop rate system of nesessment, are you satisfied with that ?-We have to messure the land, etc.; that is one objection.
- 141. Q. How would you propose to do nway with measurements?—By the introduction of pots or sub-numhers.

- 145. Q. (Mr. Ibbeteon.)—If a part of a onh-number is irrigated do you charge for the whole?—Yes, that is our
- 146. Q. What is the average area of a sub-number ?-
- 147. Q. (Mr. Muir Mackenzic.)—Is that the only improvement you would advocate?—I have not considered the question deeply.
- 148. Q. On the Nine canal, it heing a protective work, every year n considerable amount of water is reserved to be given if necessary to crops that require perennial irrigation; that is you limit the perennial area in order to have a reserve for food grain in case of failure of the rains; do you think that is a good policy?—I think so.
- 149. Q. Do you think that it is essential for mointaining the protective character of the work; is there any other alternstive; it has been suggested by some people that without essentially damaging the character of the work you might let out a larger quantity for personial crops; is it a point on which you have may decided opinion?—No, I have not decided wises. no decided views.
- 150. Q. As regards provincialization of irrigotion revenue and expenditure, that is not a point on which you have formed an opinion?—No.

WITNESSES Nos. 47 AND 48.—Mr. RAMCHANDRA ANANT MODAK, Supervisor, and Mr. Sadashiv, Vishwanath Vaidta, Overseer, Public Works Department.

Answers to printed questions.

### A .- GENERAL.

- Modak and Sitira, Malegaon and Kalwan Talnkas. We bave been serving in this district respectively for the last three and nine years. Both of no had charge of Kadwn Canal Subdivision for parting parieds. division for varying periods.
  - 2. Three statements of rainfull are attached hereto, two of them relate to famine years 1896 and 1899, and the third gives averages for the whole period for which information is available.
  - 3. (1) None, so far os tracte requiring irrigation are con-
    - (2) No insufficiency of cattle.
  - (3) Irrigators are unable to obtain an adequate supply of mannro with their limited means.
  - (4) Excepting hill tracts and black-cotton soil portion, in the eastern part of the district the soil is fit for irrigation.
  - (5) Yes, in case of bandharas, which are clossed as Second Class Irrigation Rerenuo works.
  - (6) No luck of funds in general. Given a good watersupply, credit can usually he got.
    - (7) None that we are aware of.
  - (9) The section of canal, as designed, generally proves insufficient to pass down an adequate discharge to simultaneously irrigate all crops in the trust under command. This retards growth of irrigation to a certain extent.
  - No, the area under irrigation being small as compared with the oulturable area of the district, irrigation nowhere extends at the expense of jirsynt cultivation.

No such inctances have come to our notice. The people have a strong desire for irrigation being extended to their fields.

## B .- CANALS OF CONTINUOUS FLOW.

The works under this class are assumed to he those cannie which are fed directly by river throngbont the year. There are no such canals in the district.

# C .- CANALS OF INTERMITTENT PLOW.

- 12. (1) The works under this head consist of cauels fed by rivers and natlahs, and taken off from small weirs thrown across them.
- (2) Water is distributed through obanuels by gravitation, and hy lift in a fow cases.
  - (3) Supply is mainteined-
    - (a) to end of February or March.
    - (b) to end of Novomber.
    - (c) only for a short period.
- 16 Irrication is supplemented by wells in years of ordinary rainfull in the case of many bandharas. These do

- not hold a sapply sufficient for the manurity of the orops, Rice and oimiler crops, under bandhards, requiring waterings after every four to six days, need well water also, as the supply from the channel is often irregular. In case of chillies and khapla wheat well water is said to be more heapfield. beneficial.
- 17. (1) In this district Government is the owner of such causis, and the annuel rate per sore works out to Rs. 4:42 on the area of holding.
- (2) Rs. 15 to 25 per acre as rent on the area under agree-
- (3) Not koown.
- (4) There are no such canals, as are owned by private persons, to our knowledge.
- 18. Private expenditure for bringing water to, and preparing, a field, is rarely incurred by landlord, but mostly borne by the tenant, who agrees to pay the rent inclusive of this. It is difficult to estimate it, as the tenant rarely employs hired labour. The landlord has sufficient security for recorpment as the bond for rent includes the fulfilment of other obligations.
- 19. In no case damage hes resulted to people on this account, but deterioration to soil has taken place in tracts, rich in back-soil, and in other fields, having insufficient manure, but profuse irrigation. The evil may be due to one or more of the causes, usually injuring the quality of the soil. So far us we know, lends have not been drained for removing the evil.
- 20. It is obligatory on the part of the irrigators to maintain their channels, hanks, etc., in good order by sunnal repairs. Repaire and improvements to bandhards are carried out by Government, 10 per cent. of the cost being contributed by the irrigators. All the bandhards do not require repairs annually. The average annual expenditure incurred on their account (including contributions) was Rs. 13,000 up to 1890, and Rs. 4,500 per annum onbsequently.

The system works fairly well, but is susceptible of im-The system works fairly well, but is susceptible of improvements by a greater expenditure of funds. The obligations entailed on the irrigators are not carried out daily, which thereby readers the channels inefficient. The procedure to be followed, as per Section 25 of the Irrigation Act of 1879, involves considerable delay, which causes wastage of water and thereby loss of crops. To prevent this cyll amendment in legislation is necessary to allow of immediate steps being taken. amendment in registrerendiato steps being taken.

22. Yes, in case of these minor works, by lending money, guaranteeing interest on capital, or hy paying the owner a certain fraction of the water assessment.

23. (1) The only tanks in the Nasik District is Waghad Tank, which is supplied with water from Kolwan river.

- (2) Water is let out from this tank, into the Kolwan river, letding to the Palkhel Weir, 14 miles distant. It is further taken off for irrigation through the Palkhed Canal, which feeds the Ozar, Tambat and Wadali Canals, all having distributing channels suitably located.
  - (3) Supply is maintained-
    - (a) throughout the year.(b) to ead of March.(c) Do. Do.
- (4) The several crops irrigated under the Kadwa Canals system, with present storage of Waghad Tank, rarying from 202 35 to 3.8 95 mill. cubic feet, are, on an average for the lest 14 years (as per statement attached):—

						Acres.
Perennial .		1.	•			355
Eight months				•		926
Rabi .			•			1,074
Merseen dry		•	•			149
Het wisther		•	•	•		84
Mirc. Hancous	•	•	•	•	•	51
			To	TAL	•	2,639

23. Irrigation is very rarely supplemented by that from wells in crainary years. Wells are, however, necessary in years of drought or scanty rainfall. They are particularly necessary for preserving seedlings of perennial crops requiring transplantation.

- 25. The average annual rate paid on area irrigated by Messes. the Khdwa Canals system is :-Vaidva.
- (1) Rs. 372 as average water-rate per nero on the ares cerually irrigated,
  - (2) Re. 15 to Re. 25 per sero as real on area irrigated. 18 Dec. 01.
- (3) No cahancement of revenue is paid on area irri-cated by causis and assessed at water-rates, but on lands deriving benefit from water stored above the Paikhed Weir; the enhancement of Rs. 591, in total, per annum for portions of seven villages is paid.
- 29. Reply to question 18 holds good in this case.
- 30. The tank and causle are maintained and repaired by Government at a cost of about Rs. 1-3-0 per nere irricated, including direct, executive charges, and tools and plant. The system works fairly well, but the punishment indicted for any breach of causl rules, such as taking nater without permission, results only in fines, and therefore does not prove deterrent. This results in injury to other cultivators having prior claim.
- 82. Constinction of tanks should remain in the hands of Government as heretofore.
- 33. No inconvenience has yet been experienced in this district from the liability of tanks to silt up.

### E.-WELIS.

34. The following table gives the required details for

,		Nature of tracts.	
Question.	Hilly.	Partly hilly and partly plain.	Plaia.
2	3	4	5
1700	Rs.	Rs.	Rs.
Avorage depths of permanent wells . The nature of supply, whether from springs or from percolation, and whether liable to fail, or become	Abont 45'. From percolation	About 40'. From percolation and springs.	30' to 40' From springs.
(a) in ordinary years (b) in years of drought Avorago coet of construction	Supply fails, 1,000 to	500 to	600 to 800
Average duration of a well Manuer in which the water is usually raised. Average area attached to and commanded by a well.	Over 100 By 7 to	years. motes. 10 acros.	1 to 3 acres.
	Avorage depths of permanent wells  The nature of supply, whother from springs or from percolation, and whether liable to fall, or become too saline to use.  (a) in ordinary years (b) in years of drought Avorage coet of construction  Avorage duration of a well Manner in which the water is usually reject.	Question.  2  3  Rs.  Avorage depths of permanent wells.  The nature of supply, whether from springs or from percolation, and whether liable to fail, or become too spaling to use.  (a) in ordinary years (b) in years of drought.  Avorage coet of construction.  Average duration of a well.  Manuer in which the water is usually raised.  Average area attached to and commanded by a well.	Question.    Hilly.   Partly hilly and partly plain.

- ! 37. (1) Rs. 5 to Rs. 10 per acre as rent on the area attached to the well.
- (2) None. Rates are paid on the total area attached to the well, and not on actual area irrigated.
  - 38. Yes.
- , (1) To some extent.
- (2) Difficulties are rarely met with in the actual construction of wells, except in the transport of explosives, which, according to standing orders, cancer delay. Slight relaxation of these rules may therefore be effected. No assistance to cultivators in the manner referred to appears to have been given in this district so far as we know. It would therefore be advisable to keep a certain number of boring apparatus in each district for the use of cultivators, guaranteeing cost of repairs.
- 39. It may be shown that ultimately the cost of irriga tion works per none of area irrigated by a canal and of that

by a well, practically comes to the same amount. Wellsby a well, practically comes to the same amount. Wells, therefore, if constructed by Government, in tracts yielding water at reasonable depths would be more beneficial, as those do not injure the quality of the soil. It would therefore be advisable also to advance money at a low rate of interest to persons risking their private capital and guaranteeing the repayment of the advances. Experiments may be carried out by Government in sinking a few wells at Government expense. If the results prove beneficial, Government may in future pay in part the cost of construction for new wells; the rest to be borne by the interested parties. Expenditure so incurred by Government may be recovered Expenditure so incurred by Government may be recovered by instalments later on .

40. Temporary wells are not in common use in this district. Their protective value is practically nil against drought. If they are to be of use in years of scanty rainfall, they should be deepened in ordinary years and maintained till years of scanty rainfall.

Mouthly Statement showing Rainfall during the Bamine year 1896.

1		-	-	Можие.							Total.	Bruans.
January. February.	March.	April.	May.	Jane.	July.	August.	September,	October.	Norember. December.	December.		
•	•		•	*	CI CI	a	10	11	13	n	22	16
.38	ş	00.	ŝ	18.60	69 05	28.35	3.60	80.	.43	19	120.62	Chift mailton
.00	8	\$	88.	30-05	70-35	46.40	4 89	1:11	98.	ş	163-13	Greek Just trous
00 00.	00.	ė	07.	0.37	37-88	12.01	1.40	1.67	ę.	99.	63 23	
Not rogistered.		:	:	:	;	:	:	:	:	:	:	•
00:	ş	è	60.	11.79	43.40	22-37	2.68	.30	oi.	.30	29-08	TVithin 30 miles from the Ghatte.
8	99.	è	-46	12:17	17.69	3.03	1.23	.61	32	Ş	36.37	
8	ę	ŝ	-85	2.03	20.00	202	1.24	•18	Ę	.14	35.01	
. 00. 84.	9	ş	\$. \$\frac{1}{2}\$	9.76	16.60	3 83	07.	.10	ş	.16	31-70	
00.	8	8	00.	1.01	11.80	3.78	48.	1:41	ė	60.	26.15	
00.	8	8	1.07	0.73	12:00	370	.27	80.	.03	88.	27.43	
00.	ė	35.	ę.	8.40	10 01	2:49	.63	50.	90.	ő	23.10	
00.	8	8	2.40	10.10	0.38	19-	87	8	ô.	.62	23.47	Plain country.
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Not rogistered.		:	:	:	:	:	:	:	;·	:	:	
00. 00.	ş	è	.63	8:37	18.60	2.43	98.	-16	8	.18	20.02	
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ė	8	.03	.20	11:30	27-27	10 66	1.48	25.	.19	.23	52 16	

Name of Statem.	ŕ			,			Months.	111 B.							
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Paint	. •	ş 	. <u>\$</u>	8	01.	2.13	20.10	18.4	80.0	9	Ş	1 8		000	
Leafpuri	•	8			;; ;;	\$	28.75	18.12	11.00	, E	3 8	<b>3</b> 8	\$ \$	28.33	Ghát portion.
Waghad	•			8	.58	•13	887	8-13	.75	1.78	00.	00.	; §	16.19	
Waghad Tank Bungalow .	•	÷	00. a	8	<u>6</u>	.30	1073	6.11	3-1-1-1	2.73	Ş	Ş	\$	23-50	,
Nasik	•	÷	φ. —	ş	ij	1-90	7.18	1.03	68-	3-31	ė	8	8	14.55	
Chachadgaon	•	\$	è	Ş	43	1.97	13-27	6.19	6.03	.81	ę	Ç	Ş	26.50	Within 30 miles from the Chate
Dindori	•		-	ç	.23	1-26	0.03	1.03	1.30	3.34	10.	Ş	ş	17-17	
Palkhed	•	00.	<u>ې</u>	8	8	\$	2962	.33	.41	69.9	8	Ş	ş	16-53	
Sinnar		<u>\$</u>	00.	8	ន់	.7.2	6.03	-22	.83	1.28	Ş	8	00.	9.39	
Chândor	•	8	<u>0</u>	\$	13	1.10	20.9	1.53	1.73	.83	ş	Ş	\$	12.16	
Yeola	•	8		DŞ.	90.	7.2.	1.8.5	10	1-03	9.80	8	Ģ	ģ	7.08	Plain country.
Niphád	•	\$ :	\$	<u>\$</u>	.10	.87	1.96	.38	5.53	1.00	ş	8	Ş	4.92	
Vinchur	•	.00	00-	8	90	29.	280	55	£3.	93	00.	8	8	6.29	
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	TOTAL	.00	00- 0	ô,	4.36	12-30	124.67	62-26	3420	29-66	Ei.	8.	ģ	257.67	
	Aremgo	ор •	00.	8	28.	26.	9.58	4:03	3 63	2.39	10	ş	ş	10 81	

Statement showing the Mouthly Average of Rainfall during the period from 1877 to 1900.

,	Period for which average is						Монии.	П.						Torix	Receive
Name of Beatlen.	token holading both the years.	January.	Fabriary.	March.	April.	May.	Jane.	July.	Angust.	September.	October.	November, December.	December.		
1	6	•	-	9	6	-	œ	a	93	11	2	2	118	15	16
								!			,	-			
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Igathuri.	1877 to 1900	•13	ģ	ģ	50.	18.	37.00	63-20	36.01	10-01	4.07	છું	Ţ.	136-00	
Whiphul .	1877 to 1000 .		, o	50.	<b>7</b> 0.	18.	7.80	18-31	12-38	8:27	2.74	97.	Ġ.	61.10	
Wkglad Tank Bungalow .	1593 to 1900 .	<u></u>	15:	Ş	0::	01.	0.81	50.49	17.17	10-39	8	.11.	ij.	55.71	
Chaelinderon	1894 (9 1900 .	<u>.</u>	.00	ç.	-13	10.	7.07	23 70	10.81	0.63	ç	01.	Ŧ.	68.11	Within 30 miles from
Novik	. 1877 to 1000 .	 	96.	.03	-11.	.83	01.0	8-70	18.7	6.03	3.43	ë	.18	21.87	the Unate.
Dindori	1877 to 1990	<del>.</del> .	ġ	70.	;r.	1:	60.9	9-39	670	6.16	301	£4.	ដ	31.01	
Philippi	. 1877 to 1900	-0.	ş	Ģ	ě	60	6.03	2.50	24.1	46.0	3.10	Q‡.	:13	20-03	
Sumar	. 1877 to 1900 .	÷	i.	£0.	ę;	8.5	171.	02.0	80.4	20 20	3-23	13	85.	25.80	
Chardor	. 1877 to 1000	÷	<b>7</b> 0-	ç.	ő	1:23	673	6:38	45-47	6.83	3-13	. 69.	.20	38·10	
•	. 1877 to 1900	.13	.0	i.o.	Ş	17.	62.4	4.41	3.16	60.9	3.03	10.	ê	22.68	,
	. 1877 to 1900 .	÷	<b>8</b>		ş	.70	1.67	5.14	3.19	0.21	57.5	69.	ij.	23.07	Plain country.
Vinchue	. 1877 to 1900 .	. <u>.</u>	Ģ	10.	Ė	-16	3.60	£8.\$·	3.11	7-03	3.08	85.	0; ;	31.63	
Whitelf Sathe	. 1878 to 1600	8	3.	Ģ	ģ	.;	23.52	202	29.9	6.03	65.55	ģ	8	57.03	
Pienniegon Beavont.	1580 to 1508		ģ	ŝ	•10	5.	6.33	7.63	3.61	10-0	2.00	29.	133	28.00	_
TOTAL		ŝ	18.	3.5	1:01	08.0	105-00	217.08	150-87	125-01	38.00	0.25	3.60	12.000	
Average	. • .	is.	50	ņ	. 10	99.	7.01	1941	10.00	8:13	2.68	ञ	41.	44.00	,
					_	_	_		-						

Statement showing the Classification of Crops under Kadwa Canals, as per Statement III E. of Irrigation Revenue Reports.

Messys. Modak and Paidya.

8 Dec. 01.

			Year	r <b>.</b>					Peronpial.	8 months.	Rabi.	Monsoon dry.	Special hot weather.	Miscel- lancous.	Total.
		<del></del>	·1	,	,		. •		3	3	4	5	c	. 7	8
,	<u></u>						,		450	629	457	108		143	1,788
1886-87	•	•,	•	•	•	•	•	•	520	657	301	28		65	1,580
1887-88	•	٠.	•	•	•	•	•	-	619	55O	1,141	4	17	136	2,497
1599-59	•	•	• •	•	•	•	•		204	748	1,338	463	247		3,090
1859-90	• •	•	•	•	•	•	•	•	245	751	815	284	132	} "	2,227
1500.91	•	•	•	•	•	•	•		286	1,058	1,458	64	40	70	2,971
1891-02	٠	•	•	•	•	•	•	1	275	810	1,544	63	101	82	2,825
1692-93	•	•	•	٠	•	•	•	•	302	1,005	1,644	17	27	40	3,027
1893-94	•	•	•	•	•	•	•		375	998	1,052	186	110	44	2,767
1891-95	•	•	•	•	•	•	•		350	1,031	1,063	13	23	,,,	2,489
1895-98	•	•	•	•	•	•	•	•	336	1,285	1,574	32	110	68	3,403
1896-97	•	•	•	•	•	•	•	•	203	1,552	1,049		260	30	3,103
1897-83	•	•	•	•	•	•	•	•	203	990	1,240	40	47	30	1
1898410	•	•	•	•	•	·	•	•	371	897	373	784	53	43	2,658
1899-1900	•	•	٠	•	•	•	•	•	3/1	100	013	164	03	45	2,520
						Тот	AL	•	4,000	12,061	15,043	2,097	1,179	703	36,915
						Aver	tigø		355	026	1,074	149	81	51	2,630

- 1. Q. (The President)—You are a Supervisor in the Public Works Department ?—Yes.
  - 2. Q. Where are you stationed f-At Nasik.
- 3. Q. You say in your answer to question No. 3, "the section of canal as designed proves insufficient to pass down an adequate discharge to simultaneously irrigate all crops in the tract under command. This retards growth of irrigation to a certain extent." Will you please explain that; do you refer to canals in general?—Yes, the section is not large enough. If the section were larger we could give more water for a shorter time instead of a small and environment supply. Lontinuous supply.
- 4. Q. That only applies to where you have a tank or reservoir behind you?—Yes.
  - 5. Q. It would not do for a bandhará ?-No.
- E. Q. What works have you got ?- In my charge there is no irrigation work; there are only some bandhards.
- 7. Q. You have no canals or tanks under you !- No.
- 5. Q. Where was your experience gained?—I was in charge of the Kudwa canals in Nosik.
- 9. What had you specially !- The Mhasnad tank in Sholapore.
- 10. Q. What area was under irrigation then !-- I think in 1898 there were about 12,000 acres.
- 11. Q Is the system of applying for water in vogue there?-Yes.
- 12. Q. They are not allowed to take it without canction ? ---No.
- 13. Q. Are they fined if they do P-Yes.
- 14. G. After a man has cout in an application, when does he get a reply?—It takes about a mouth; in urgent

- cases permission is given as soon as the application is Mr. Modak. received in the Sub-Divisional office. 18 Dec. 01. 18 Dec. 01.
  - 15. Q. Is it refused over ?- Very seldom.
- 16. Q. Do you think it is necessary to have an application ?-Yes, otherwise anybody would take water.
  - 17. Q. But there are Inspectors to look ofter it ?-Yes.
- 18. Q. Do you think people would take irrigation more readily if there was no application required !—Yes, but it would not pay.
- 19. Q. Have you had experience of more water than you know what to do with ?-No.
- 20. Q. Was the whole of the Minswad tank water taken in 1696?—Yez.
- 21. Q. (Mr. Muir-Mackenzie)—Was not some given to the l'andarpur Municipality ?—Not in 1896.
- 22. Q. (The President)—You say in paragraph 20, "it is obligatory on the part of the irrigators to maintain their channels. banks, etc., in good order by annual repairs. Repairs and improvements to band hards are carried out by Government, 10 per cent. of the cost being contributed by the irrigators." Is that rule about 10 per cent. regularly in force?-I think so.
- 23. Q. Suppose a cultivator refuses to pay, what then, is he put in preson Y-I am not aware of such a case like that; I have never heard of a mun refusing to pay.
- 24. Q. Then you go on to say, "the system works inirly well, but is susceptible of improvements by a greater expenditure of funds. The obligations entailed on the irrigators are not carried out duly, which thereby renders the channels inclicient." Will you explain what you refer to? The silt is not properly cleared in time and therefore the discharge is interfered with.

- Mr. Modak. 25. Q. Do your overseers or subordinates look after the work when it is being done by the villagers ?—No.
  - 26. Q. In there anybody to see to it ?-No.
    - 27. Q. They are left to themselves F-Yes.
    - 28. Q. How do they know what to clear ?- They clear away the soft silt.
    - 29. Q. Havo you had nnything to do with the Waghad tank? Very little; I only once saw it.
    - SO. Q. You say on page 4, "difficulties are marely met with in the actual construction of wells, except in the transport of explosives." What do you refer to ?—Gunpowder.
      - 31. Q. Is that difficult to get in villages ? Yes
    - 32. Q. You say on page 5. "It may be shown that ultimately the cost of irrigation works per nere of nea irrigated by a canal and of that by a well, practically comes to the same amount. Wells, therefore, if constructed by Government in tracts yielding water at reasonable deptire, would be mare beneficial as these do not injury the quality of the soil." Do you think Government should construct a number of wells?—Yes, at least to begin with, to show the people how advantageous they are and how they simuld be made
    - 33. Q. Do you think the number of wells might be increased very largely? -If takari advances are given and the rate is reduced.
    - 34. Q. Is there any difficulty about takavi ndvances?-There are some delays.
    - 35 Q. Do you titlek more advances would be taken if it was unde easier?—Yet.
    - 36. Q. How would you suggest to do it?—By showing the record the record to bore for water; by spiceding the recovery of odvances over a larger number of years; and by reducing the rate of interest.
    - 37. Q. Do the people complain of the interest charge on advances ? - I have not heard them.
    - 39. Q (Mr. Higham)—Applications for naturate pot made in the case of Landhards !— No.
    - 39. Q. On what works are these applications made?—Only on 1st class works, as in the cross of the Kadwa river work«.
    - 40. Q S ipposing a number of owners made an application orce for all, and they be able to distribute the supply among themselves every year without application;—I don't think so; The area and the enquand their location in a particular surrey number often wary from year to year; therefore applications received one year example serve as a guide for regulating the supply next year. The culticators are moreover scarcely able to make a common cause.
    - 41 Q We clear the channels now "-No, not in the numor distril aunres.
      - 2. Q Are you speaking of the Radwa const ?- Yes.
    - 42. Q He p opic have to clear their minor distributance f-Yes.
    - 44. Enproving a number of the members of a village asked for water, would they not be able to take mater without going every year to capai officers and to make their own orrangements for its distribution in the same way as people do on Landhdrais!—That has not been tried apprehen. anruhere.
      - 45 Q. Do the people clear their bhanddras?-Yes
    - 46 Q. Then why doo't ricy clear their minor channels?
      —They don't on matter of fact do it; wien applications are received and the channels are in bad order we issue a forinight an iter that the water will be stopped and then stop the su; piy if the channel is not cleared.
    - 47. Q. Do they clear it after they get n notice of that sort ?- 1 cs. generally.
    - 48 Q. They clear it if they want the water and don't if they don't want the water !-Yes.
    - 49. Q You say repairs and improvements to bandhards are carried out by the Government, 10 per cent of the cost being contributed by the irrigators i—Yes.
      - 50. Q. They also have to do their petty regains?-Yes.
    - 51. Q. What are the works that Government do ?-Such improveme, ce as escopes, etc.

- 52. Q. And they always take 10 per cent.?-Yes.
- 53. Q. Do you think that cannis injure the quality of thosoil ?—Yes. By water-logging; it gradually becomes useless for cuitivation.
- 51. Q. Has any land gone out of cultivation ?-Yes, in the Kadwa canal system.
  - 55. Q. What crops do they grow there !- Dry erops.
- 56. Q. What dld they coltivate before in the land that has got water-logged? -Ordinary crops; the outturn ic very poor.
- 57. Q. Is that due to want of manner or excess of water? Probably to excess of water.
- 58. Q. Where there is well irrigation there is no danger?
- 59. Q. (Mr. Rajaratne Mdlr.) -- Referring to the system of applications for water, in whose does the rayar apply? -To the Inspector and then it goes to the Sub-Divisional office.
  - 60. Q. And then to the Executive Engineer ?-Yes.
- 61. Q. Is there my time fixed for presenting the appli-
- 62. Q. No time is fixed ?-No; I think they should be submitted a fortnight before the u-cossity for unter arises. It is never rejected, unless there is no water.
- 63 Q. Then what is the necessity for the application? -Anybody might take water he one year he might have one acresy number and then it may change; in one year he might have one crop, in another year another.
- 64. Q. How do you regulate the quantity of water re-quired?—By accertaining the total improximate orea of the various crops under irrigation, and by calculating the quantity of water required.
- to. Q. Are the rayate presented if ther irrigate before rangetion :- 1 have not heard of that being done; we are a double assessment, that is all.
- 66. Q. (Mr. Muir-Maclensie)—Is that possity often imposed !- les, it is to be imposed in many - hes, it is to be imposed in mony cases, at hast in famine years, searc-if in normal years,
- 67. Q. (Mr. Rajaritan Milr.)—Hid you any experience of the last familie year?—Yes.
- '8 Q. On what work?-On the Mhasead lank in Spolaput,
- 60 Q On the Markal tank the working expenses are Rs. 18,000 and the revenue Rs. 19,000; why are the worling expenses so high?—The rapid is so scattered.
- 50 Q. In that tank the duty is only 52 acres per cubic first per second, may is it so how as computed with other works i-The religation is very scattered, and there is a great deal of percols on and maste in travell.
- 71. Q On page Sat the rad of paragraph 20 you say, "to prevent this eril amendment in legislation is necessity to allow of immetia's steps being taken." In what direction? —Test notices may be disposed with—canal water being stopped at once.
- 72 Q (Mr. Muir-Markenzir)—Was the Mha-rad tank ever quite full in your time !—Ves, it was full in 1996 and floods passed over the weste-weir.
- 73 Q. Was it capable of irrigating the full 218:0 a-res? -No. 12.000 acres were irrigated.
  - 71. Q. The water in the tank was not sufficient !- No.
- 74. Q. In 1801-95 what was the state of the tank?-It was full.
- 73. Q. Why was water not taken then for 12,000 acres ? -It was perlaps a little less.
- 77. Q. The average is only 5,000 a yes . Why is so little nater taken !- Perhaps the waste weir was reduced.
- 78. Q. In eight years the average amount irrigated was 5.0.0 neres F-1 think the lowners of the area was due to lowners of the westerweir; besides there is great leakage
- 79 Q. In ordinary years is all the water available taken ? -Not much remains at the end, as far as I remember.
- 80. Q. You don't tidink there is any reluciance on the part of the cultivators to take the available nater in an ordinary year :- No.

- \$1. Q. What was the first year you went to the Mhaswad tank?—In 1895.
- S2. Q In that year only 3,400 acres were irrigated, why was that?—The waste-weir was low.
- '83. Q. Was all the available water taken !- I don't remember.
  - 81. Q. (Mr. Ibbotson.)-What is the depth of the black-
- oil which you irrigate from the Mhaevad tank?-Perhaps Mr. Modak. 1 to 3 feet. 18 Dec. 01.
  - 85. Q. It has muram underneath f-Yes.
- S6. Q. When you speak of the leakage, do you mean that your channels cut into the muram or that the soil takes more water ?- Both.
- 87. Q. In 1895-96 the level of the waste-weir was low; in the subsequent year the area was more than double?— Every year two feet was added to the waste-weir and so it was gradually built up.

# WITNESS No. 49.—Sadashiv Vishwanath Vaidra, Overseer, P. W. D., Nasik.

- 1. Q. (The President) .- You are an Overseer in the Public Works Department P.- Yes.
  - 2. Q. You are stationed at Nasik ?- Yes.
- 3. Q. Have you had charge of any tanks !- I was in charge of the Kadwa Canal Sub-Division for soven years.
- 4. Q. Haw much had you under the canal?—The average is from 2.000 to 3,000 seres.
  - 5. Q What is the soil !- Blackish-red.
  - 6. Q. Not deep black cotton sail ?-No.
- 7. Q. Have you had the Waghad Tank under you?-
- S. Q. Do they send in applientions for water in your parts ?-Yes.
  - 9. Q. Is that necessary f Yes.
- 10. Q. Is the water all consumed, or is there more water than you require?—At present the tank is not fully developed, it is mostly consumed.
- 11. Q Do you think if the tank was fully developed there would be too much water?-Almost all the storage would be consumed
  - 12. Q. The water is taken every year ?- Yes.
  - 13. Q. Does it go into any small tanks !- No.
  - 14. Q. If you want to protect the place from famine

would you make wells or a canal ?- If there is a possibility

of ninking a conal, it is better then wells.

Paidya.

- 15. Q. Yen say in paragraph 39 of your Note " Wells therefore, if constructed by Government in tracts yielding water at tensonable depths, would be more beneficial, as these do not injure the quality of the soil." What is the injury to the quality of the soil from canals ?- Under cann's irrigators use too much nator, which washes away the beneficial soluble salts in the soil.
  - 16 Q. Could you not put any check upon that? -No.
- 17. Q. Do you think Government should make the wells?

  No; they may help the irrigators to make the wells by takavi advances.
- 18. Q Do many apply for these advances now?—S. far at I know very few, probably the conditions of taken do not snit.
- 19 Q What is the difficulty ?-They should be allowed a langer period to return the instalments.
  - 20. Q What would you like ?-About 10 to 20 years
- 21. Q How lang do they get now ?- I am told only ten years
- 22 Q. Do you think if it was made 20 years many people would apply ?-Perhaps.
- 23. Q. Is there may other way in which it could be made more popular ?-Not as far as I know.

WITNESS No. 49.-Mr. GARESH SARHARAM KHARE, Sub-Engineer, Malegoon, Narik Distric'.

# Memo, by Witness,

The following report refers to Pinpalner, Dhalia, Sind-kheda, Amalnor, Sindhada and Nondurbar tsinkas of the Khandesh Collectorate, and Kalwan, Baglan and Malegson talukas of the Nasik Collectorate, and is made by Sub-Engineer Mr. Gapesh Sakharmo Khare who had the apportunities of processing and appearance of non-cours in the discourse of the contractions of the contractions. tunities of personal experience of alor years in the district during his service in Kasadesh Iragation.

In the first place I beg to bring to notice that in giving the following information I have limited myself to the only question of old Irrigation in the district

In these parts the rivers and even small nallahs have perennial supply of mater which is picked up by the construction of small masorry dams called locally "banakiras" for a too chancels, varying from a few hundred feet to three for which channels, varying from n few hundred feet to three miles; are constructed and lands belonging to one or more villages are irrigated. Irrigation on a large scale on any one channel is not attempted. The total area irrigated by the shore system is nearly 25,000 acres, bringing in a constituted revenue of hand and water shares amounting to Rs. 2,02,000, of which Rs. 33,000 is lead share and Rs. 1,70,000 water share. Instances of two rivers, viz., the Area and the Vanna are taken to show the quantities the Aram and the Musam, are taken to show the quantities of water which have been taken advantage of, by the system of these bandhords. The catchment area of the river at the last handhard on the Aram is about 170 square miles while the irrigation on the same is 2,376 acres, of which nearly one-fourth is high class irrigation of sugar-cane. Ordinarily six acres are taken as irrigable for every million cubic feet of water stored up in a reservoir, which can be kept under control.

In the present case the area is irrigated by taking advan-tage of the storage as it were, of underground springs. It would not be inneh out of the mark if I take that for every three nores irrigated one million cubic feet of water

By this assumption a storage of about 800 millions cubio fire of water is required for the irrigation of these 2,375 nerss in a catchinent of 170 square miles. This is equal to ners in a catchment of 170 square mices. This is equal to the storage duot on ron-oil of two inches on the above eathermost. Similarly the Mosum has a catchment of 380 square miles at the last bandhard and the area irrigated is 5,803 acres and this at three acres per million cubic feet would be equal to a storage of about 2,000 million cubic feet, or

equal to a run-off 22 inches over the eathment as utilized. It will therefore be seen that the soil along the tributaries of the Topti taking their rise from the Western Ghats has a or the 10pit taking their rise from the Western Gluss has a terry great power of absorption and retention of the rains. It follows therefore that the soil in Khandesh Irrigation Dienici is in great contrast with laterite soil, which absorbs much water like a sponge, but et the same time gives it out immediately without ietaloing it in its interior, also not like miram soil which has less power of absorption, nor like black cotton soil which has been water in few feet halor spacement, but does not soorting to in few feet below surface only, but does not contribute to underground storage. These handhards and channels seem to have been constructed when Mahnwedons were the released Khanile-h Dieric', and in making these channels good many tunnels through yellow soil have been constructed, which seems to be a peculiarity of Mahomedan construction, as may be seen in the water works of Mahomedan and the seems to be a peculiarity of median period made at Junuar, Amangabid and other

It will be seen that now-a-digs whenever any water work for a town supply or irrigation purposes is contemplated, a tank or a reservoir drawing its storage from surface water is generally first thought of. So during Mahomedan times taking advantage of underground storage seems to be their first consideration. They have gone even to making conduits from underground spring-ter purposes of irrigation as may be seen from the "Hapistag" conduit near Junnar supplying water to under 30 arres of irrigation made by an Abyssinian since of Chand Bibi of Ahmednagar dynasty.

Absorption is looked upon as so much loss to irrigation and no doubt it is so to the overground reservoirs, but for underground reservoirs it is so much gain. Anything done to increase absorption will help these works.

It would appear to a superficial abserver, seeing sa much underground so, ply in the vicinity of towns like Dhulia, that tapping underground supply would have perhaps given a briter filtored supply to the town. And it may be seen if it is not passible to come nerosa a safficient supply for Malegaon and other towns in the bashs of the Penjhara, the Mosam and the Girna Rivers, if water works are to be proposed for them.

Mr. S. V.

18 Dec. 01.

Mr. G. S. Khare. 18 Dec. 01.

Mr. G. S.

Khase.

The Mahemedan Rulers did not stop by constructing works for utilizing underground water, but they tried to construct tanks also, but failed in the attempt. No less than 30 tanks were constructed in Nandurbar Taluka olone, but all of them have breached.

There are a large number of hills near Nandurbar and other places south of Tapti which run parallel to each other and at right angles to general drainage of the country giving passages to all the rivers and nallahs, large and small. The genges are very narrow, and large tanks can be constructed at a very small expenditure. The difficulty is about waste-weirs and the failures of so large a number seems due to this related than any other state. to this rather than any other cause. These hills are emi-cently suited for the construction of tanks. A look at the topographical sheets of Nandurbar, Dindia and others will show what a large another of tanks are possible. The old tank of Gondar is near Dhulia on this port of range, so was Wadi Bhokar Tank, which breached after the floads of 1898. Sand Phokar and, constructed in the last famine, is in the same sort of hills, so are the proposed tanks like Dudhala, for Nandurbar unter supply, Chopala and Raitel tanks. A

- large tank in Kathlawar, I am told, has been constructed in the same sort of hills. It would be worthwhile to consider the restoration of the old taoko and construction of new tanks. It would increase the direct irrigation and also indirect irrigation and also new trans. It wood increase the direct irrigation and are indirect irrigation by increasing the underground supply. Large tanks will do much good, but small tanks would be useful as small famine relief works.
- Forests are a great help to the old irrigation work by preventing denondation and by increasing absorptive quality of the ground, but their utility may considerably be increased by constructing small tanks not so much to hold water but to improve the forest land. This would give great work to famine labour on small scales. This would prevent the washing away of rich moold propared by the great agustes of the san and the atmosphere during the year. Absorption will be increased as rain water will tarry a while before it finds its way by the waste-weir provided, and the greath of forest will considerably increase on the new reclained area. I would go so far as to propose making temporary tanks of Mr. Strange's design with small ontless discharging in 24 hours whatever run-off has been gathered in the tanks in a couple of hours. in the tanks in a couple of hours.
- 1 Q. (The President.)-You are Sub-Engineer of Molegain :-Yes
- 2. Q How long bare you been there :- I've about nine
- 3. Q. You say you confine yourself to the question of old remarkon f = Yet.
- 4. Q. That is to say wen have but nothing to do with recont irrigation?—No. I have been for the last nine years making small projects and looking after repairs of old irrigitton norks.
- 5 Q You say "collinguly ely series are taken as freignable for every million cubic feet of water stored up in a reservoir. Ho you ear that from your can electration?—
- 6. Q. You say " in the present easy the area is lerigated by taking advantage of the etergo, as it were, of underground springs." Do you man the fundhard system it. Yes.
- 7. Q. Then son soy "it would not be ruch all the morth if I take it that for every tunce times impost benemialish author feet of material media. I - hear to the goes to make a where some had could be impated by that water.
- S. Q. Where does it up to ! Is it not picked up he a landland hear down !- Up to Neventher a recentive it is not picked in, it goes to waste. In Herender and Japaners to pupile generally also their landlands.
- 5. Q It g es to waste become they 4 not want it !-
- 10. Q. Poglislan t wir imanifectel to be enter? -Romatereigig vang satte ibite landbarde.
- II. Q If their did not close thore, could they not outply mater to more land? Yes, they could
- 12. Q. They do not care to "-- No. Tecame they cannot usuate high class cops.
  - 13. Q And they do not imput jour !- No.
- 14. Q Catten? No. They impate fast thee accordly engagence, thirdly wheat and afterwards hajri.
- 15. Q. Do yet think it would be of any nee giving them more nater, if they do not eare als at it is. We might try.
- 16 Q What Lappened when the rife falle if Tier ttak water for grain crop.
- 17. Q. Did nice surfly very much mater in Nicht during il e famire !-Yes.
- 18. Q. What do you think is the best thing for Government to do to protect the district against another famine?— To some places I would be noticed orizate in works. The some receive would telp the Mel Lain tali,ka
  - 19. Q. Would the profestate mater ?- Yes.
- 20. Q. Let eay they do not over fer irrigation except for high ches coper.—They irrigate high class crop entirently hat they take it for primerops when these is drought.
- 21. Q What are the high class crops they cultivate ?-In the Nasik Collected early early year at exceptions exist. e-could year sugarcane, thinky our select and then hajri.
- 22. Q. What is the grey extion, I alf of wheet and Enjoy? Lee It is a quality to take in.

- 23. Q. You do not call bajri a high class crop ?-No; neither wheat.
- 23 Q. You think the extension of irrigation would help them !- You
- 25. Q. What area is there in Nasik that is irricable, there roany acres ?- I have not got the statistics.
- 26. Q. Could you irrigate one-fourth of the district or nestenth?-One-tenth, most of the Lifty portion cannot be cultivated.
- 27. Q. Do you think that that would belo very much in times of famine? Yes. There was a great difference in the sufferings of the arrigated and non-usigned villages.
- 2. Q (Mr. Hipforn)—Yen say "similarly the Moram has a catchinent of 380 square miles at the list foundated and the arm impated 3. so acres and this at 3 acres per million cubic feet mulities e pul to a creage of atomic form million cubic feet i—Yes.
- 2.4. Q. That is the quantity of water stored in the tank?
- (0) Q. It is supplied ented by a further expely from the springs in the exerted by the personnal flow of the river?

  We have two exercises to the care, but principly in tanks like the Albaral there is no flow.
- 31. Q Is not a great deal of interation done by the few of the river before the river falls without grawley on the sterage tank !- Yes,
- 32. Q. They do not draw water from the propage tank antil bot do not November !- In small tanks they do not in the more could there he authorism water; but not from tanke which use n tifel by n fer mial etrears.
- 5%. Q. topinein; a tian mante to make a rem landlieit below an entering one, is he allowed to its so ?-Treee las ber no of priling made, at least as far as I know.
  - 11. Q. No new bin Ildras are note?-No.
- 15. Q. Them binthindrare eldens ?-Yeuther were milen big time ego
- of Q. Sup; we when you come to the lower bundling there is a lot of water waning over, can any buly pick up that notes i -1 do not are any objection to that.
- 17. Q. Supp sing any one manted to make a new dam to first it up, is there in alling to prevent him i-No.
- 18. Q. Do you know of such a case ?-No.
- 22. Q. Init terms there is no water to pick up or because it is not the custom f-Because they connect spend somethmency on landfibris.
- 40. Q. Are there my plane at which, if they could so not the more, they reject to able to pick up more water?—There are a few place on the Panjin. Near the Atum river there is a banching. the water to protter nal'alt from it.
  - 41. Q. P. th these rivers have surplus water? Yes,
- 42. Q. All through the year f-The Arara Las all through the year.
- 43. Q. You may short Nandmilar there is a rib for a tink f—Yer. There are publish bills at right-angles to the water coarse.

- 44. Q You speak of a great many tanks made by the Mahomedans in the Nandurbar taluka being breached ?— Yes, and rendered usoless.
  - 45. Q. Why ?-For want of a waste woir.
- 46. Q. It is quite possible to make new tanks there ?-
- 47. Q. Could those old tanks be repaired !- Yes; estimates were made by Lieutenant Hart some years ago but the work was not carried and.
- 48. Q. No tanks have made up recently P-No, only the Talwad tank was made in the last famine; it was an old tank re-made.
- 49. Q. Are there any land numers in this district who make tanks themselves !—I do not think they are rich eaough in build tank.
- 50. Q. (Mr. Ibbetson.)—Ym speak of underground storage tunnels ?—Yes. There are many tnanels which are underground. There is one at Jagakhad they have limed it; I do not know when it was made. Perhaps shortly after the British conquest.

- 51. Q. What is it supplied from !-From the Masal Mr. G. S. liver.
  - Rhare.
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- 52. Q. How did they come in msko underground tunnels?—The bank is so high that instead of making an open channel they have made an underground passage in the yellowish soil.
- 53. Q. You say tanks one be easily made at a very small cost f—I think so.
- 54. Q. Do you think the people will use the water ?-
- 55. Q. Would they have used it before the famine or will they use it as a lesson from the famine ?—Tanks have besn used for irrigation purposes for a long time.
  - 56. Q. Only very few P-No. Almost thirty tanks.
- 57. Q. Why has not Nasik been covered with small villago tanks if the people are used to irrigation ?—I cannot Estimates were prepared for the construction of villago tanks.

# WITNESS No. 50 .- Mr. RANCHANDEA CHINTANAN KHARE, Pleader, Shirpur.

# Answers to printed questions.

- 2. (a) As to gross and culturable area in the district of Khandesh, I cannot give definite figures, as I have got no statistical registors with mo.
- (b) Khandesh soil is on the whole a good soil, though it cannot be properly described as rieli black leam. The soil is not generally meist for want of sassicient rains. It has got, however, a great power of absorbing and retaining moisture.
- (a) The average rainfall por year varies from 15 to 30 is ones.
- (d) The seath-westerly mensoone give but scanty rains, and artificial irrigation is found a accessity.
- (c) Wheat, gram, rice, bajri, plantain, and sugarcane generally require irrigation.
- (1) Wheat and rice crops require watering overy eighth day. Sugarcano requires it every fourth day and bajri every fifteenth day. Of coarse this rale varies, as the capacity of the soil to absorb moisture is greater or less.
  - (g) Gujarat has generally insufficient ruius.
- (A) As a rule the cultivators irrigate their garden lands all through the year. Some crops, however, only require watering for about four months from October coward.
- (i) The distribution of water is controlled by the Government officers specially appointed for the purpose. In years of drought the canals dry up, and crops consequently suffer a good deal.
- 3. (a) Small tanks may be constructed an Khandesh soil, and carthen doms without mascary work would do when the extent and the size of the tank are not very great. Khandesh soil is not very rich, and hard seil can be got nbout 4 or 5 feet below the surface. A dam about 7 feet in height with stone-pitching nu the surface is sufficient to hold water.
- (b) In Khandesh land requires artificial irrigation oven in good sensons, for generally the rainfall is insufficient and scenty. Besides all lauds necessarily require artificial irrigation from October onward, and Government is not at all likely to suffer, from financial point of view, owing to elack domand for canal water.
- (c) All land-holders of black soil are desireas of having an irrigation work on or about their soil, and they are sare to take the best possible advantage of any tank that might be constructed un or acar their hads.
- 4. In Shirpur taluka of the Khaadesh district there are many sites where canals might be conveniently constructed at a comparatively small outlay. At Kervand in the said taluka the site is a grand one, and a tank constructed there will provide water to the whole taluka. Plans and estimates are already made and the project has been approved of by Govornment.
- To questions 5th and 6th I cannot give any definite answer for want of statistical information.

- 7. (a) Although in a famine year the number of wells Mr. R. C. increases, the total area irrigated is less than in ordinary Khare.
- (b) I cannot give exactly the number of wells constructed in the last decade, nor can I specify the cases in which Government help was given.
- (c) It is certainly desirable that Government sheald encourage in all possible ways the construction of new wells and should advance tagai in cases where it is found neceseary.
- (d) In the years 1899, 1900, and 1901 the rainfall was insufficient, and the consequence was that many wells got dried up and the people had to abandon them.
- (c) In Khandesh the depth of underground water varies from 30 feet to 80 feet, the depth increasing with the quality of the soil.
- (f) The average annual expense for one well with one met is about Rs. 250 and the annual income is about 300 to 350. The number of acres watered by one well with one mot varies from 2 to 4 acres, the area irrigated being the greatest when the quality of the soil is the poorest.
- (g) I have no personal knowledge about artesian wells and their possibility in Gujarát.
- 8. (a) Crops at times suffer from more than necessary rain when the sell is rich. But these occurrences are so scarce that no consideration need be given to them.
- (b) In this district there are very few lands which suffer from water-legging and consequently no expenses are necessary in that direction.
- 9. In Khandesh people were employed in the last famine, on read-metalling and read-making. The earthwork of Shirpur-Chopda Road was completed in the last famine, but no farther steps were taken to metal the road and make it complete. The consequence is that the road is not completed and is damaged by rainfall.
- 10. (a) In Khándesh no programmes have been prepared before the famine set in, and a good deal of time was spent before works were settled upon and opened for work.
- (b) In the last famine two plans have been approved of in case any more funue visits the district.
- 11, 12, 13. I cannot give any definite answers to these questions.
- 14. The pretective value of irrigation works in the last decade is not very great. Irrigated lands are taxed very heavily, irrespective of the consideration that the canal water is insufficient in years of drought. People roared up valuable plants such as limbu, santra, ganvas, otc., under valuable plants such as cimes, santra, garvas, otc., under the expectation that the water-supply would be sufficient to maintain them in all years. That expectation not being realised, people were put to great and parmanent less when the sudden drying up of the caual destroyed their valuable plants.
- 1. Q. (The President, through Mr. Muir-Mackenzic as interpretor.)—What is the minfall in Korvand?—From 15 to 30 inches.
  - 2. Q. Can you read the gauge ?-Yes.
- 3. Q. Were any plans passed for the Shirpur and Kervand projects ?—Plans were propared by Mr. Karpur (the Executive Engineer) about two years ago for Korvand only. But I do not know the particulars.

Mr. R. C. Khare. 18 Dec. 01.

- 4. Q. They are situated in the west ?- Yes.
- 5. Q. Do you think these two works will supply the whole taluka with water?—Yes; Kervand will supply the whole taluka except the hilly tracts.
- 6. Q. No you believe in the irrigation of black cotton soil P-Yes.
- 7. Q. Even it it is deep ? Yes. If in the light cotton soil five neres me irrigated by one mot only half the area would be irrigated by it in deep black cotton soil.
- 8. Q. (Mr. Higham.) You say a well of one mot costs about Rs 250. for its working throughout the year; has that been your own experience !-Yes. Ra
  - 9. Q Can you give us details ?-Yes.
  - 10. Q. What are they?

1 pair of bullocks co	141 Kg. 10	00	Cyvital	Ra.
charge for	depreciat	ion	and	
interest .			•	20
Farm sercants .		•	•	195
Agricultural labour	•	•	•	20 to to
Grass for cattle .	•	•	•	60 m 76
Mote and taising ay	inatatus	•	•	23
		T	ital	253

- 11. Q. (Mr. Ibbetson.) What is your profession?-I am a Pleader.
- 12. Q. How much land do you own?-About 1,200 to 1,400 neres.
  - 13. Q. Do you belong to no agricultural family ?-No.
- 13. Q. (Mr. Rajaratna Mdlr.) Do you lease your land or do you cultivate it yourself !- I cultivate some and let
- 15. Q. What rent do you get from your tenant?—It vailes from year to year; for the 1,000 acres that I have let to tenants, I get about Rs. 1,200 as rent, of which Rs. 200 to lis. 300 are received in cash and the balance in kind.
- 10. Q. If you take it in money how do you fix it approxi-mately?—According to the quality of the soil. If I take half the produce that would sometimes mean considerable gain and sometimes loss, especially for land higher up in the fulls.
- 17. Q. Can you tell us on an average what percentage the land yields on the outlay?—About 74 percentage, but in some cases the land 18 naturally good, and in others we have to spend money on improvements.

WIRNIAS No. 51 .- Mg. NARAYAR VISHNY, Supertisor, Peons Irrigation.

Answers to y rinted questians.

Mr. N. Piehnu. 18 Dec. 01.

#### A .- Graffal.

- 1. The answers below refer to Peops District (Purnadhar Haveli, Bhinthadi and Indapor Teluksy. Having bear solely in charge of largation works (construction and administration) for the last 234 years, I have had opportunities to see personally into all the detailent irrigation management.
- 3, (1) There is no abstacle for extension of irrigation from spatistry of population,
- (2) Insufficient supply of cattle does not form an obstacle to the extension of languation.
- (3) In-uff-irner of manute Is a consilerable obstacle to the extension of irrestion.
- (4) Uneunability of all has not much to do with the extension of progration.
- (8) Uncertainty of the supply of mater or its too late commencement or too early constilled does in some way form an obsiscle to the extension of strigglant.
- (6) Lack of capital for the critial esp-nilitute funds for the norre expensive entitled but irreguled encys very employed by uneithers with the experience of irreguler.
- (7) Fear of cilared tent or revenue accessment dies impole the extension of Irrastion.
- C The extension of irritation has not yet tended to injury remaining controlling by structing his criticators to the tribused tracts.

There is a very atrong desire evine I among the people of this district to have the means of irrigation extended to it or increased.

## B -Canals or Contintors From

- 7. (1) The value of the pridow of land is in-reveal by 25 per cent, by collivation of two harrests instead of one.
- (2) By the substitution of a me for less unimable empt is increase in the rains of the positive is also it digrat court.

  (d) (a) in a year of ample rainful tie taken of the
  reduce of land is not more as by irrigation to any appre-
- produce or ra-ciable extent.
- (b) In a year of a routy rainfall the value of the produce of field increases by irrigation by 100 per cent.
- (e) In a year of dought the value of the produce of land increases by most lon per cent.
- 8 The menass in the total around rater of the produce per note that in the irritation [1] on the average of a normal term of years is Rs 50 and (2) in a year of drought Rs. 77 per nore.
- e. (1) Anoual rate per nore pail on account of irriga-tion by the cultivator to the owner of the (canal who in this district to Government) is the II on area not cally watered.

- (1) Re. 5 per aero of the actual area irrigated or the area of the holding is the average rate of payment by the cultivator to the owner of the land in the form of enhancement of rint. Sometimes this rate ries up to Hi to 15 rupes per acre, deposing up in the conveniences of cultivalion, such as proximity to markets or certires of popula-
- (3) lis. 3 or thereshous are paid by the namer of the land to the florerisment in the form of collamement of recenuser water alreadage rate up the whole irrigable
- 10. Turice arms per acre for the initial cost to bring the water to the field and four arms for periodical reports is accepted and its, to for preparing the land for irrigation. This expenditure is always lorgered by the terror. Prospective increase in the value of event is the only accepted to recomment. are alty for recorposent.
- security for recorposent.

  11. Damage is done to the soil from irrigation without manner, also from no prefer or too frequent watering and also form waterlagging or sait efforcemet. This also affects the insult of the project softing in close provincing to such lands. The form of the decrimation of the soil is the loss of its fertile property. The extent of the degree is not to will increase with the continuous of tripation on let the also remembed circumstance. The copy of the defendance in the defendance of the dispersion of the defendance in the dispersion of the description of the dispersion of naturals or presenting sie deter oration is by the deter praisen is by-
  - (i) Replacing the lost natritive elements.
  - (2) Stopping prefuse and frequent valerings.
  - (3) Clange of crops.
  - (1) Introduction of improved drainage nords.
- The impation is of 16 years' standing, and the coil sprang from it 12 to 13 years and include stationary. On people on leads proceed with drawing are much better than crops on lands with ut dealence.

# C .- CANALS OF ISTPENITIEST PLOY.

12. (1) The manner in which the his Nellacand and other groups of earths at Jeur, Walsh, Include and Manla Nalishaju the Para dher Taluka of the Poors Dietrict are supplied with water in en mu fer :

A small temporary is not is thrown every year at the class of the mere come or at such times which necessitate irrigation. The position of the band is generally at the head of a drop in the nallah hed so that a classical cut from the side of the band can take water to the land along the banks of the railah or to fields which can be commanded by the

(2) The distribution of water to the lands commanded by the above-mentional channels is up to according to the areas to be watered during a facility of rotation, which is generally taken to be a fortnight.

Mr. N. Viehnu.

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- (3) The period for which the supply is ordinarily
- (a) a year of ample rainfull is between October and June;
- (b) a year of sounty rainfull between October and February;
- (c) a year of drought these causle do not act at all.
- 13. The extent to which the value of the produce of land is increased by irrigation is similar to that of lands under causls of continuous flow in years of ample rainfall.
- 16. Irrigation under intermittent canals is generally supplemented by wells where it is possible, and this is essential in years of scanty rainfall.
- 17. The annual average rate per aere paid on account of irrigation-
- (3) by the ewner of the land to the Government in the form of enhancement of revenue or water advantage rate is about Rs. 3 per acre of irrigable area.
- 18. Private expenditure necessity to bring the water to the field or to prepare the land for irrigation is the same as for lands under canals of continuous flow. The expenditure is incurred by the tomant and he has no accurity for the propagation of the propagation in the relation of the propagation in the relation of the propagation in the relation of the propagation is the relation of the propagation of the propagation in the relation of the propagation in the relation of the propagation is the relation of the propagation in the relation of the propagation in the relation of the propagation in the relation of the propagation in the relation of the propagation in the relation of the propagation in the relation of the propagation is the relation of the propagation in the relation of the propagation is the relation of the propagation in the relation of the propagation is the relation of the propagation in the relation of the relation of the propagation is the relation of the r
- recomponent except prospective increase in the value of crops.

  19. Deterioration to the seil has resulted from irrigation without manure. The profuse, too extensive or too frequent irrigation, water-logging and salt cilloreseence are a recely met with on these canals.
- 20. The maintonance, repairs, silt elearance and the like are all carried out by the irrigators at almost no cost, as bodily labour is contributed by each irrigator. The system works well and no legislation is required.
- 21. All such canals are constructed by private persons. No trouble has over arisen in regard of the supply of water and of the realization of dues for the same. Government has not found it necessary to take over the management of private canals.
- 22. It is advisable to encourage and assist the construction by private persons of farther tannla. This can best be done by inducements of low water-rute for a period of years after the construction of such causls. Advances may also be given for initial expenditure.

### D.-TANES.

- 23. The tanks in the Pouns District are supplied with water by (1) flood waters of the nallahs an which they are built. There are some tanks which are fed from the canals of continuous flow in addition to the floods.
- (2) The distribution of water to the lands is made in the same way as for lands under causis of continuous firm.
  - (3) The supply is ordinarily malutained-
    - (a) In a year of ample minfall for a whole year.
    - (b) In a year of seanty rainfall up to oud of January 14 possible.
    - (c) In a year of drought the supply is altagether doubtful.
- (t) The area ordinarily irrigated from a tank varies with the capacity of such tanks.
- 21 The answer to this paragraph is the same as noted under paragraph 7 above.
- 26. The answer to this paragraph is the same as for paragraph 16 above.
- 27. For answer to this paragraph please see puragraph 8 above.

# Poons District. (Deerna.)

# Question No. 2 .- (Culturable and irrigable areas, etc.)

Answer.—Ordinarily there is no demand for vater for trigation during south-west monocons except percunial crops. The following statement shows the crops under irrigation and other particulars:—

Crops.	Numb of watering		Time.	Renaurs.
Perennist .	27 to :	30	13 months	Pan gardens (Letel-leaf) Popula water sacry lih
Eight months † .	13 to 1	15	Jane to January	day. 1 His number of referings yaries seconding to
Monsoon wit t . Rabl 7	1 - 4	2 4 U	June to Delober Dilta. November to L'chrunry.	the quantity at dimier- val of rainfall,
Hot wrather stodder crops)	O fo	8	Match to Jone .	

28. The masser given to puragraph 0 above applies to this paragraph.

22. Vide answer to paragraph 10 above.

SO. The maintenance (watching, repairs, silt clearance and the like) is provided for by Government at an annual approximate cost of Rs 1½ per acre irrigated. The system works fairly well and no legislation is required.

31. There are no tanks in this district constructed by private persons.

92. It is advisable to encourage and assist private persons in the construction of further tanks by employing famine labour on them and by granting special concessions to owners of such tanks.

88. There is not much inconvenience experienced from the liability of tanks to silt up, as the silting always takes place in the deepest parts. No statistics regarding the silt accumulation are unvalable. The silt is not removed by dredging. Stops are taken to prevent ultimate silting up of the tanks by leaving sluices in the lowest parts of the tanks.

### E .- WELLS.

- 31. (1) The arrange depth of permanent wells is about 40 teet, the water surface bring about 30 feet deep and depth of water at the beginning of hot weather 10 feet.
- (2) All wells are invariably supplied from springs; in case of wells close to and under canals, the supply is from canal perculation also. These springs are liable to fail in a year of drought: they do not, however, fail in an ordinary year. There are no saline wells in this district.
- (3) The average cost of construction of a permanent well of two mots capacity (that is, a well which can supply water for two mots all the year round) is Rs. 1,500 to 1,000. The average cost of kachcha wells is Rs. 250 to 300, the cost always varying with the diameter of the pit and the material used in construction.
  - (4) The average duration of a well is 75 years.
- (5) The water is usually raised by mote drawn by two or four bull-cks according to the size of the mote and the depth from which water has to be lifted.
- (6) The average area attached to and commanded by a well of one mot is four acres and that of two mots from eight to ten acres.
- (71 The average area irrigated is two acres in any one year.
- 3S. Serious difficulties are met with in the selection of a spot in which a suppty of water will be obtained. No difficulties are met with in netual construction. No assistance has been offered by Government or by local bodies in the shape of expert advice, trial borings or otherwise. It would be useful if it were given, and this can be done by appointing an engineer who can give expert advice by taking lovels and borings.
- 30. The construction by Government of wells in and which is private property is fersible if the wells were constructed on junctions of three or more survey numbers, so that one well could be useful for all. Such an arrangement will reduce the cost of a well to a minimum and the rental charges payable to Government ought to be consequently very slight.
- 40. Temporary wells (bhudkis) are commonly used in this ill-strict where possible. They are, however, no protection against draught as they full with the nallahs. In a year of seasty ramfall temporary bhudkis should be encouraged by supplying to the cultivators the necessary appliances at nominal rentals.

31

The distribution of water if under Government supervision is controlled by the rotation system, by special establishment appointed for the purpose; and irrigation revenue is remized as a separate water-rate in case of tank irrigation which is under Government control and for which capital and revenue accounts are kept; but the irrigation rate is shuply an enhanced cess on the lambs irrigated from ald irrigation works for which only revenue accounts are kept.

Question Nn. 3 .- (plack cotton soil.)

Answer.—When the land irrigated is black soit there is no durand for water in areingo minfall sensons, but it is required when there is prolonged drought. In years of good rainfall there is a folling oit in irrigated areas and the revenue is more piecarious than on tanks where the lands are other than black soil. There has been a great desire on the part of owners of black soil lands to have irrigation tanks, because this district has not good and seasonable rain daring one out of five years. There are not continued stretches of black soil and generally no average cultivator possesses all kinds of hands and any one of which requires water for crops grown on it in all seasons of the year. Directly, tanks as not reconnegative, but they are desirable in so far as they conduce to the general welfare of the surrounding district.

Mr. N. Vishnu.

Question No 4 .- (Government irrigation works.) Answer .- The Nira Canal and the Mutha Canal can 18 Dec. 01. sofely he depended upon in a season of drought.

Question No. 6 .- (District or village works.)

Answer .- The protective value of these works can he increased by expending more money on them and by greater attention to their up-keep and by constructing naw works. Local responsibilities abould be enforced. The value of such works (without reference to irrigation) concerning the water-supply of villages for men and oattle is very great. . Question No. 7 .- (Wells.)

Answer.—It is both desirable and possible to stimulate construction of new wells by inducement and advances to land-owners.

Out of 155 wells inspected and for which information has been gathered, 114 have failed to supply even an ordinary supply for drinking purposes. Nine wells were despended with the nesult that all of them supplied an increased quantity of water, but not quito sufficient for the asual area under those wells during previous years of good rainfall. Three wells failed ultogether. Average depth of water helow surface 30 feet; and orea irrigated nuder each uverigad two acres. Average cost of each well used for irrigation is Ss. 250.

# Question No. 8 .- (Drainago works.)

Answer.—Tracts of land under the Nira Canal in the villages of Moorum, Karinja, Wadgaon, Paudhera, Sangwi and under the Mutha Canal in the villages of Manjri, Hodapsar and Moondva have been water-logged by excess of percolation from the canals and the had nature of the soil; but this area is only about one per cent. of the whole water-logged had the soil that the area water-logged and the soil and the soil of the whole water-logged had been soil to be soil t irrigable area. There are no dreinage works and none are

Question No. 13 .- (Irrigation receipts and charges.)

Answer.-Water-ruten are fixed from time to time on each tank separately for the various crops grown. Appli-

cations for water are received annually (every season) for crops raquiring it. The distribution of weter to applicants is controlled by—

- (1) demand and supply available in the tank;
- (2) priority of application for water;
- (3) situation of the lands to be watered; and
- (4) nature oud value of the crops requiring water.

The effect on irrigation and irrigation revenue is very marked in years of good rainfoll. In years of favourable rainfall, the monsoon and rabi irrigation areas fall off by almost 76 per cent. There is not, however, much falling off af reveoue, as perennial crops come to prominence is such years. Arrangements are always made to keep the tanks empty at the beginning of the monsoons of each year. The supply in the tanks cannot be made to leet longer than one year all the calculations for the tanks are based upon 12 months' samply only. the construction of the tanks to hold moathe sapply only, the construction of the tasks to hold water over 12 moaths' supply being a more waste as replenishment is a certainty from the regular ghat rains.

Question No. 11.—(Vulne of works in reducing cloims for famine reliof.)

Answer.—The protective value of irrigation works can not be in this district oversated.

Areas irrigated under these tanks in 1807 were as fol-

Acres. . 12,691

Mutba Caual ٠ Nira Canal . . 47,514

No villages protected by these works required any famine relief in 1897 and in subsequent years. Had these works been non-existing the cost of famine relief would have increased in this district by at least 10 lakhs of rupees in any one year of famine.

- 1. Q. (The President)-You belong to the Public Works Department f-Yes.
- 2. Q. What appointment do you hold?—I am a sopervisor.
- 3. Q. How long have you been in the department?

  Twenty-three and a half years or a little over that.
- 4. Q. You have always been in the Poona district ?-
- 5. Q. How long have you been in the Irrigation Divi-sion?—From the beginning of my service.
- 6. Q. You know the Nira Cooal and Mutha Caual?— Yes, I know hoth. I have worked on the former system as well as the latter for years.
- 7. Q. You say, "The Nira Conal irrigates 45,000 acres?"

  -Yes, that was the area last yeer.
- Q. What is the maximum discharge of your cunal ?-450 cusecs; there is a proposal to calarge it to 720 ouscos.
- 9. Q. Where does the water come from ?-From a
- 10. Q. Is it proposed to enlarge the storago also?—Yes; two new sites were selected; what hecams of the proposal I do not know.
  - 11. Q. In the water freely taken on the Nira ?-Yes.
- 12. Q. Always ?-Yes, but most freely during the wheel season.
- 13. Q. Do the people apply for water every year?—Yes; every season for rabi, kharif, and the hot weather crop. The hot weather crop is between 31st March and 15th June.
- 14. Q. Do you give water then for fodder crops?—Yes. When we have easiscient water we give it; otherwise we
- 15. Q Do you give water to sugarcane P—Yes, and to comogardon crops which are carried over from the fabi season. For hot weather crops we charge separately. Sometimes the onlivators take the woler without leeve; we then charge a higher rate.
- 16. Q. Do you think it would be wasted if they did not apply it ?—The difficulty would be to manage an equal distribution. There is a rush for water sometimes and the people don't obey orders. Even now with the applications, it is difficult to the state of the stat it is difficult to regulate the distribution.
- N. Q. How is the water given out of the sand; they you small sloice?—We have outlets. We estimate that a particular outlet can irrigate so many acres und if we find the applications on an outlet more thou we can irrigate

- we redoce the area for each cultivetor proportionately. The Mira Canol is a protective work and we have made arrangements to give water to the cultivators proportionately to their holdings.

  18. Q. Whom do the outlets belong to ?—All the outlets belong to Government.
- 19. Q. How are the sites fixed ?—According to the land to be irrigated. The whole land between two nollahs can generally he irrigated by an outlet.
- generally he irrigated by an outlet.

  20. Q. If you abolished the application system, what would be the result?—The result would be that persons at the head of the outlet will be able to irrigate their lands and persons at the tail will get no water at all. We so orrange that everyone gets water every five days or eight dars. days.
- 21. Q. You ebut the oatlets for a certain number of days and keep them open on certain days?-Yes.
- 22. Q. Does the cultivator of the head take advantoge of the open outlets ?—No. From these outlets we have smaller outlets for which locking arrangements are made. The outlets are generally kept open for three days. The Pathkari begins ut the tail and weters each field in rotation. tion.
- 23. Q. What is the volume of water delivered?—Our distributaries carry about 60 ensecs; the coulcts to the fields deliver chout 1 cusees.
- 24. Q. Water is given to every opplicant in rotation?— Yes, by Patkarrs and Chowkidars; we pay Rs. 7 to the mon who opens the outlets and Rs. 11 or Rs. 12 to the mon who measures the areas and sees that cause rules are
- 25. Q. Is it not difficult to find houest men for this work?—Bribery is always going on. When tangible proofs of dishoaesty are produced, we dismiss the men. There is no other way. From experience I believe that the cultivators are more at fault than the canal establishment. Even if the distribution were left to the villagers than would be porticilities. there would be portialities.
- 26. Q. Is there my leakage in the canal ?—The canal is not water-tight, but we have made many improvements. We lose halt the water by leakage in 100 miles.
  - 27. Q. Does the cauni run all the year round ?-Yes.
- 28. Q. Is the water in the canal muddy ?-No.
- 29. Q. Is there always a demand? There is never any doubt-shows, the people taking the water?—No.; there is always a demand.
- 30. Q. Have you say black cotton soil under the canal f

- 31. Q. Have you any experience of black cetton soil ?-
- 32. Q. Yon say "there is a great desire on the part of awners of black-soil lands to have irrigotien tanks, because this district has not good and seesonable rain during one out of five years." De you think that where the rolus are so uncertain as in Poona, the people will take water to irrigate black cotton seil P—I am not certain, but I should say they would take water in four out of five years. The seil is not the real black cotton soil. Dering the last three years the drmand has been very great.
- 33. Q. You spoke about the project for enlarging the canal P-Yes. Our water is not sufficient for all the requirements of irrigation.
- 34. Q. Do you not irrigate the whole of the irrigable land every year ?-No, if the canal is enlorged it will irrigate a much larger area.
- 35. Q. You propose to irrigate a larger area without any increase in the length of the canel !-Yes.
- 20. Q. Is your canal connected with any village tank?
  -- No, the Mutha Canal is connected with two tanks.
- 37. Q. Are these tanks fed by the canal f-Yes, they ore fed by the canal and by nallah water.
- 39. Q. The object is to store the water that goes down?

  —Yes. One tank is being made on the Nira Conal.
- 39. Q. Te there room for mere?—There is room at the tail of the Nira Canal for three mere tanks. A good deal of water goes to waste.
- 40. Q. Supposing it was desired not to allow any noter to go to waste could you make a reservoir to hold all the moreon supply?—I do not think so; the cost will be prohibition
- 41. Q. But the result would be a great increase of irrigation !- Yes.
- 42. Q. The Nira is worked with the object of being a protection against familue?—Yes.
- 43. Q. It is the largest canal in the Presidency f-Yes, excepting Sindh.
- 44. Q. It irrigates 47,000 acres?-In some years it irrigates about 60,000 acres.
- 45. Q. What is the culturable area commanded ?-
  - 46. Q. It irrigates about &?-Yes.
- 47. Q. To irrigate a larger area you would want to lengthen your channels:—No. They would require widening.
- 48. Q (Mr. Higham)—Is the land left follow at times?
  —No, the practice in these parts is to go on manuring and growing crops every year.
- 49. Q. (The President)—Supposing the irrigated area is increased, could the people get sufficient manura for it?—That would be a difficulty; but there is an inexhaustible supply of fish manure which is now coming into vogue.
- 50. Q. Would they use it for wheat and juari ?—At resent they use it only for sugarcane, but in time they will use it for everything.
- 51. Q. You say, "in a year of anuple rainfall the value of the produce of land is not increased by irrigation to any appreciable extent." Doyon find prople taking to irrigation in such years?—Na, not when there is a good rainfall and when they are sure that the rain will be quite sufficient.
- 52. Q. Supposing they get a good minfall up to the 15th October and then there is no more, what do they do?—Then they rush for water.
- 53. Q. You don't generally have rain in the cold weather?—Sometimes. I know of a good rainfall throughout the whole rabi season in December and January.
- 51. Q. That is very exceptional?—It happens once in four years or five years.
- 65. Q. Then the people do not take canal water?-No.
- 56. Q. What do ther pay for irrigating rabi?—As. 2 per acre on the Mutha Canal.
- 57. Q. Wenld they take more if they had to may less?— Na, they would not. They don't mind paying the full rate for only one watering when they want water.
- 58. Q. Would they pay o rapes more ?- I think they would.
- 50. Q. For rabi?—Yes, they take water without permission so as to get it quickly and pay double rates wilhardy.

- 60. Q. Would that be in a year of drought?—No, any year. They take water without permission and we fine them charging double rates.
- 01. Q. Does the distribution require a very considerable establishment?—No. A Patkari looks ofter about 200 acres.
- 62. Q.—You have 250 Patkaris?—Ne, we do not increase the establishment when the area extends. We keep a permanent establishment according to the area under percential crops. During the rabi season—four menths—we generally put on Assistant Patkaris to guard the outlots.
- C3. Q. Are not these men open to bribery?—At times there is a great rush for woter and it may hoppen that they are bribed then.
- 64. Q. Do yen think you could abolish the application system altogether ?—No; it would not do. If we give up the system there would be great complications and difficulty in assessing the rates.
- 65. Q. Why, you can measure the areas irrigated P—
  It eaunot be done. Daring the kharif season they plough
  directly the crops are out and unless we have opplications
  our establishment cannot find out what particular holdings
  have been watered.
- CC. Q. If a man does not upply and takes water he is detected now t—Yes, he is detected because it is not a matter of a week or four days; it is a motter of four months.
- 67. Q. Do you prepare ony list of persons who apply?

  Our establishments have to make a list of all persons who are permitted to take water.
- GS. Q. You say u man who lakes woter without application can be detected during there four months?—Yes.
- 69. Q. Many are detected ?—Yes. The difficulty will be for our establishment to go to onch field. Then the man who takes water this year may not take it next year; so overy time we would have to make fresh lists of persons taking water.
- 70. Q. How do you assess the lands?—Applications are received through the village anthorities; we make sure that the man is the home file owner of the land; then our Inspector goes to see that the land is properly prepared for Irrigation. A pass is then granted, a copy of which is registered in the Sub-Divislonel office. The Patkari on his round of inspectom examines these passes. Atterous or two voterings are done measurements are taken. The measuring officer takes with him the register of the passes and has a map with him from which he finds out the number; if he finds that there is any helding which is not registered, he measures it and reports that such and such a holding has been wetered but not detected by the Inspector or the Patkari. An explanation is asked for and if it is not satisfactory the Inspector or the Patkari is fined or dismissed.
- 71. Q. You say "orrangements are always made to keep the tanks empty at the beginning of the measons of each year." What do you mean by that ?—In the case of the Bhatgarh reservoir we open out our gates at the beginning of the meason and lot oll the water out. We get a telegram from Bombay that the meason has burst before we open the gates.
- 72. Q. What is the advantage?—We do that so as to prevent a deposit of silt brought down by the first floed.
- 78 Q You never try to keep your water for two seasons?—These reservoirs ore not made to last for two seasons. In the case of the Mutha Canal, it is very difficult to keep the water for even one season.
- 74 Q (Mr.Migham)—When people on the watercourse send in applications for the area they want to irrigate, I understand that you are bound to give a certain quantity of water from each outlet on the days the outlet is open?—Yes.
  - 75. Q The canal is divided into sections ?-Yes.
- 76. Q. The water is ued to each section depends upon the area for which the pass is given?—Yes.
- 77. Q. When water goes through the outlet does the establishment have anything to do with regulating the distribution within the watercaurse P-Yes. They begin to open the field outlets at the end of the distributaries.
- 78. Q. They begin at the end?—Yes. The end people get the first day's water, and an the last day the people at the head get water and then the outlet is closed.
- 79. Q. Have you seen the circulars which were lately brought into operation?—Yes. All these orders have been carried out.

Mr. N. Veshnu.

18 Dec. 01.

Mr. N. 80. Q. J Fishnu. late institu quontity of 18 Dec. 01. of its torn.

- 80. Q. Yon have a Check Inspector?—Yes, that is a late institution. A Check Inspector sees that a proper quontity of water is given; and that no outlet is open out of its torm.
- 81. Q. He has oothing to do with the distribution or control of the field outlets?—Nothing.
- 82. Q. Hie cootrol is limited to the canal openiogs?-
- Yes.

  83. Q. Your Patharis alone control the distribution inside the watercoarso?—Yes.
- S4. Q. The Inspector does not control that?—No. Ao Inspector bas general control over two or three Patkaris. He has only to see whether the area which has to be watered is watered or not doring a particular period, and if anyhody has remained without water for some reason or other theo to allow him certain days and make up hisquantity.
- S5. Q. What is the length of your watercourse?—The smallest is only 50 to 90 feet. They run up to about a mile in length.
- SG. Q. How long are the distributaries?—Some are 18 miles loog; but there are small distributaries where pipes are 4 to 6 icohes and the discharge is 3 cubic feet per second. All the distributaries are built by Government.
- S7. Q. At the end of the Government distributaries, you have o distributing basin?—Yes, on both eides. We find it very difficult sometimes to carry water by the distributary, wheo therois deficient water in the canal. We have theo to make fresh arrangements to give woter of the head on particular days and to give water at the end out of rotation.
- 88. Q. What is the plan of the watercourse?—For every noe hundred seres, we allow a 12-inch square outlot.
- 89. Q. It makes no difference whether they want it for rice or bajri?—It does. This will suffice for 100 neres of juari; we take juari as oor basis.
- 90. Q. Do you put a lock to the field cotlet?—Yes, otherwise the cultivators open it.
  - 91. Q. Who locks the outlet?-The Patkari.
- 92. Q. Do the coltivators ever break them?—Yer, sometimes. We then five all the cultivators on that outlet if they do not find out the man who has opened it. If we have reason to believe that all the cultivators have combined and opened the lock for the purpose of irrigation we fine all.
- 93. Q. You get them fined by the Magistrate?—No, we only tell them that so much damege is done and that they have to pay so much.
  - 94. Q. And do you recover in that way ?-Yes.
- 95. Q. Do you ever prosecute them for damage?—Tes, when a man is cought to the out; but the difficulties of prosecuting are very great.
- 96. Q. Whom do you proseento them before ?—Before the Mamlatdar; bot it is very troublesome. Our establishment has to go before the Mamlatdor to proseente and then there is nobody to look after our distributaries. We avoid proseentions as much as possible and punish them departmentally.
- 97. Q. You have ootlets 12-inch square for every 100 neres?-Yes.
- 98. Q. That is a greet number. What is the irrigable ares on a watercourse?—It goes up about 5,000 to 0,000 oeres on the biggest watercourse of which the command is 30,000.
- 99. Q. When do you measure the crop?—Kharif crops are measured after the first woterings are over, i.e., from the middle of August to October or November.
  - 100. Q. Doriog the currency of the crop ?-Yes.
- 101. Q. Do you have fical measurements?—No. Ten per cent. of the crops are measured by the Sub-Divisional officer or any of his sub-officers.
- 102. Q. Suppore any area measured after the first waterings fails to mature how is that remitted ?—The cultivator has to apply; we do not give any remission without application.
- 103. Q. What is your final area compared with your register?—We find that the orea measured is always about 25 per cent. more than what was applied for.
- 104. Q. Do you take any notice of that?—Yes; we assess the netual area measured and oot the area applied for.

- 105. Q. Who measures ! We have got regular measuring karkens.
- 106. Q. Are they under the Collector?-No, they are under the Irrigation Department.
- 107. Q. Bot the Irrigation Department people have to obey the Orders of the Collector?—Yes. But the Collector has nothing to do with the assessment.
- 10S. Q. Is there any appeal from the orders of the Collector on caonl questions?—Yes.
  - 109. Q. Allowed by roles ?-Yes, by the Canal Act.
  - 110. Q. Do they make many appeals ?- Very few.
- 111. Q. You say that during the famine of 1897 no relief was given to any of the villogers who irrigated from the Nira and the Mutho Canals?—Yes.
- 112. Q. Did any people from the Mutha Canal villages go on relief works?—As far se my ioquiries go nobody went; they bad sofficient work io their own villages.
  - 113. Q. They had good crops?-Yee.
- 114. Q. Did they employ labour from other villages?-In very small proportions.
- 115. Q. Yoo say 10 lakhs were spect on famice reliefs is that a rough estimate?—Yes.
- 116. Q. Iu 1876-77 Government spent on the Nira villages 11 lakhs of rupees?—Yes. I was there; I know the figure.
- 117. Q. In last famioe Government had to spend nothing?—Nothing. In 1876 the Mutha Caual was finished up to the 25th mile and beyond that they had famioe labour.
- 118. Q. Do yoo recommend the construction of tail reservoirs?—Yes.
- 119. Q. Do you recommend them for the irrigation of black-soil or any soil?—Anywhere; the block-soil here is not the black cotton soil of the Berars; it is a black oil which requires water.
- 120. Q. It only requires water in the case of dronght?—. Yes; in other seasons the soil grows good crops without watering.
- 121. Q. Do they grow wheat without water !-Yes, in seasons of very good raio.
- 122. Q. If they use water in a year of good rain does it do any harm?—They don't care if they get a 12-anna crop; some crops get damoged by the canal water.
- 123. Q. Wheat orop get damaged by excessive watering ?
  -Yes.
- 121. Q It blights and rusts ?-Not by canal but by rain water.
- 125. Q. (The President)—In paragraph 11 of page 2 you say, "damage is done to the soil from irrigation without manare and also from water-logging or salt efflorescence." Is there any salt efflorescence on the Nira Canal?—Between 13th and 25th mile there are one or two square miles on the right bank of the canal where there is efflorescence.
- 126. Q. Has anything been done to remedy it P—Nothing.
- 127. Q. You have got no experience of drainage ?—No, ~ that was suggested at ooc time by the Inspector General for Irrigation, Mr. Forbes.
- 128. Q. Woold you recommend drainage?-No, I don't thick drainage can do acything for salt efficrescence.
  - 129. Q. Is it getting worse?-I hove no experience.
- 130. Q. You don't think it is likely that if land is well drained it would waso away the salt?—I have no experisone.
- 131. Q. Have you ever known o year in which all the water was oot ased on these causls?—On the Mira Caoal, yes.
- 132. Q. When was the last time?—I remember two years when we had to let out 50 feet of water.
- 133. Q. 1895 was one year; what was the other f-1890 or 1891.
- 134. Q. How long has the canal been working?—Since 1884. Every year we lose a little water, but these years nere abnormal; we had to send down water.
- 135. Q. Because the raio was excessive?—Yes, and there was no demond for rabi water.
  - 136. Q. You say every year you lose a little?-Yes.
  - 187. Q. Nothing very coosiderable?-Ro, very little.
- 138. Q. (Mr. Ibbeison) You say the canal has been working from 1884? Yes.

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- 130. Q. In 16 years you have had two years in which you did not make use of all the water ?—Yes, before that the canal was not in working order; every year swater is let down for the facility of raising the dam.
- 140. Q. (Mr. Nuir-Mackrazic)—How is it that the irrigated area is much larger in famine years than in the years of ordinary rainfall?—Because the people don't take water in the rabi season.
- 141. Q. If people don't take water how is it that you have not an excess ?—We increase the area of sugarcanc.
- 142. Q. (Mr. Ribetson.)—If yoo have a short supply of water you give less to sugarcane?—No; if water is short we out off the area at the tail.
- 143. Q. Supposing another man wants water beyond?—We dan't give it. We say, "grow your sugmeans under
- 144. Q. You do out dawn the applications?—I'es, that is only on the Min, which is a protective work. On the Mutha, which is a productive work, all the demands are met.
- 1.15. Q. Do you give water first for irrigating sugarcane on the Mutha?-Yes.
- 146 Q. You look upon that as a commercial concern?—Yes.
- 147. Q. Why do von make that difference between the two canals?—The Nira Canal is a protective work.
- 149. Q. And the Mutha Canal?—It is a productive work.
- 149. Q. You don't know the origin of the difference?-
- 150. Q. What kind of villaga works have you. Have you bandhards?—No, we have small tanks.
- 151. Q. Have you any experience of tanks?-Yes, of two
- 152. Q. Am there not many dauks in Poona?-There are four tanks in working order.
- 153. Q Not several hondrods?—Not more than half a dozen or at the most nine.
- 154. Q. You say, "local responsibilities shoold be enforced." What do you rocan by that?—People should be made to clear the silt.
- 155. Q. I thought Government was responsible for clearing the silt?—No, in sonall tanks it does not pay; Government would be paying more than the return.
- 156. Q. Where it is not worth Government's while to clear, what do you do. Do you make people do it?—Yes, and if they don't do it, we give them a tortuight's notice that the water will be slopped.
  - 157. Q. Do you stop the water?-Yes.
  - 158. Q. And they are afraid of that F-Yes.
- 159. Q. In the case of village tanks supposing these people don't clear them, how do you manage?—When there is mater in the tank, they clear it voluntarily.
- 160. Q. Da you think legislation would be useful to enforce them to do it P-Yes.
- 161. Q. If tanks are so useful and valentle, why have you not got a number of them, as in Gujarat?—The want of funds is the principal obstacle.
- 162. Q. The people are paorer here?—I have not seen the Gujanat tanks; here a small tank would not cost less than its. 20,000.
- 163. Q What do you mean by soull tanks. How many acres would they irrigate?—About 100 acres would be the
  - 161. Q. Jis. 260 per sere ?-Yes.
  - 165. Q. That would be pretty castly?-Yes.
- 166. Q. It would not pry Government to make them ?-
- 167. Q. Yon say, "out of 166 wolls inspected and for which information has been guthered, 114 have failed to supply even an ordinary supply for drinking purposes?"—All these are above the canal.
- 103. Q. They began to full in the first famine year f-They did not full in the first year; in the second year there was good rain; last year they fulled.
- 169. Q. This year have they failed ?—No, not yet; there was better rain; there was no water in the nullnis last year.
- 170. Q. How about 1890-97?-I was not on the Nfra then.

- . 171. Q. Will you tell me what wells you refer to?—The wells higher up than the caual; all the wells below the caual did very well.
- 172. Q. Do you thick the wells above the canal were a fair type of wells throughout this district?—Yes, in the constorn part. I have seen peculiar things in connection with these wells; I have seen people digging a chain of five or six wells ranging from high ground into ravines. On the top they got good water but oot below.
- 173. Q. You say five or six wells in what area?—In not more than by acres. I know another case in which five wells were sunk in 30 acres and praved too much.
- 174. Q. (Mr. Higham)—The falling of the wells occurs at the same time as the general falling of the spring level throughout the whole equatry owing to drought ?—No; it was irrespective of that.
- 175. Q. (Mr. Ibbetson —You say in your second memo., paragraph 10, that "Rs. 16 per nore are required for preparing the land for irrigation"?—That is sugaroane irrigation.
- 176. Q. You say, "it is advisable to encourage and assist the construction by private persons of further canals." What further canals do you refer to ?—Small canals from streams.
- 177. Q. What would you do to get people to do this How could you help them?—The best way to help them would be to get bandharas built by Goreroment.
  - 178. Q. Would that pay Government ?- I think so,
- 179. Q. You say you would charge no water-rate?—Yes; to induce them to take it up.
- 180. Q. Do you think they will do it on these terms?-
- 181. Q. Supposing you say yoo may have the water for nothing ?—They will do it then. In 1896-97 on the Mutha they turned every deep by means of bunds.
  - 182. Q. That was a famine year !- Yes.
- 183. Q. If the people had three or four good years do you think they would make bunds?—Yes, becomes they would get water for high class crops, which would be more paying than the high rate crops on the caust.
- 184. Q. The canal charges two rupees an acre?—Yes, for rabi crops; the charge for sugarcane is the same on both works.
- 185. Q If a man makes a hund?—No; on the channels all the water is picked up and charged full water-rates.
- 186. Q. You say that the construction by Government of wells in land which is private property is feasible if the wells are constructed on junctions of three or more surroy numbers." Do you think the people would care to have Government going into their lands and making wells?—Yer.
- 187. Q. They would have to pay wet revenue?—They would not grudge paying wet revenue; the difficulty will be of a regular supply; if the water is not sufficient, Government will be the losers in many cases.
- 188. Q. Do you think that the holdings are so small that the people cannot allord to make wells ?—No; there are many cultivator, who have got big holdings; but they one think whicher they can get water or not. If expert opicion could be obtained as to sites they would spend their own money on making wells.
- 189. Q. 1)0 you think boring tools would be useful?—Yes, in these parts, but not on the rocky portions.
- 190. Q. Why not?—Because they are not fit for boring rocks.
- 191. Q.—(Mr. Rajratna Mdlr.). You say if a rayat irrigates his laud without obtaining formal sanction he is hable to a double charge?—Yos.
- 192. Q. Even though his application is not dealt with for a month or two f-It does not take so long to deal with his application.
- 193. Q. It may be at least two or three weeks ?—Inspectors have orders to send in their reports, within three days after the receipt of the applications. Generally the cultivators' applications are not currectly written. There is some flaw in them. As soon as no application is received we have to see whether the bund is properly made and the channel is cleaned of silt and weeds. Ten or cloven days is the maximum delay.

Mr. N.

18 Dec 01.

Mr. N. Fishny. 18 Dec. 01.

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- 191. Q. Does the raynt as a rule change his crops from car to year?-No. Only sugarcane plots are changed every three years.
  - 105. Q. For others crops ?-No; it is too expensive.
- 196. Q. Could not some plan be adopted for dispensing with applications in regard to other crops !-- It is difficult to find probable plots.
  - 197. Q. You have a system of penalty?-Yes.
- 198. Q. You give them water out of turn in some cases P-Yes; the Sub-Divisional Officer does it.
- 109. Q. Has sanction to be obtained in such cases soon as watering on a particular channel is dono the Putkari reports that so many numbers are left without water; and the Sub-Divisional Officer issues orders that water must be given on Sunday, which is set aside for that purpose.
- 200. Q. Do you think the people would be able to regulate their supplies by turns if you allowed a certain quantity of water to each distributary and left it to the rayate to distribute according to their turns ?—I think it could
- 201. Q. There would be no difficulty you think?—No: but it would take a long time to work successfully as the collinators would at first fight among themselves and these at the heal would be more benefited than these at the rnd
- 202. Q. But you would not supply them before their turn? You would not open the claims? i—Once the claims are opened the distributory is at their disposal and the meant the head could use up more unter than these lower dawn. Even now somebow or other a man at the head gots most major.
- 200. Q. Are there many presentions on the Nica Causi ?-Not very many.
- 204 Q. How many per numer i "Not mere than five; we don't go in for proceedings to it establishments, are per to much instrucenteres, and them is cowly to look after ther roth
- 205 Q. Dayer fix the area to be arrivated f.—Yes, in a veir of mounts. In other years the man who applies first gate water frot
- . Let Q Each though he may be a ten applicant P—Year ten applicant and P applicant.
- 207. Q. The per their neadly de !- Ver, exten mater "Il le giren to juari etch.
- 200 Q leaver a count du fix les the mander et f. de 12 green et complement example.
- 200. Q. West in the rate for the Re 2 present. It also done to greatly of dates not the errors in which is to const.
- 210 G the man take one not be of untermodel—Yes, entrageneral requires four unterpose, we to be unsafer until process unsecure and we chouse the will be the to use of metan me have please of view to discuss the fewly.

  211. G the mean united has a thing to do with the safer—No.
- 1812 Q. You margo Re South them you give enterfaceling the entermal.—They always require his water-increased on and a three-leving traped to first Hunch to 18th Jane
- 218 Q In property had of a common order and an interior server in the hillship in experimental and specific persons to consider the construction of traffic the locally granting special commonders to expert of a relative the property of the property of the construction of the property of the property of the property of the construction of the property of the property of the property of the property of the property of the property of the property of the property of the property.
- 216 (2. 16 will en to a low rate of interest?—less that we did the contact of diseases there.
- 215 Q Do sea the may would rose formed on those parts of the many had not been as I for the people will not a former.
- 216 Q Afr. More Unelevel)—Have you racked whether in you district the number of a sile consider the counter to the log to be reard during the faction i—Ver.
- 217 Q thate the to the proceedly then shows ful in anding we can be to which which will be seen to be an top-debut not sufficient to consider grow in the years of drought.
- 218. Q. Bat several to grew then be cellium your?-

- 219. Q. Do you think that wells would be useful ?-Yes, in ordinary years; in years of drought they would not be of any use.
- 220. Q. Do you think that the wells made in these famine years will always be of use to the people?—Yes.
- 221. Q. You don't think people are too lazy to work them?—No; they are keen about irrigation, but the diffi-culty is that often they do not tap water.
- 223. Q. Were the greater number of these wells dug from takari or from private resources?—I could not say, they have built some wells with takari; how many I could not say
- 223. Q. What is the cost of a well?—That differs in different localities. In Kara ralley there are wells which east lis 3,000 or Rs. 3,500. Between the Kara and the Mutha the water is about 35 to 40 fort deep; there is a rock for about 10 or 12 feet, the soil above is black.
- 221. Q. Do you think it is worth building them f-How much do they irrigated—If there are fruit trees they will irrigate about 6 acres of froit trees in addition to 8 acres of erdinary crops.
- 225. Q. Are these irrigated crops very much superior to the ordinary monscon crops?—Yes, generally.
- 226 Q. They don't grow grain crops i-Very little unless they are hard present. They grow fodder for caltle, and a grain called. Hendi for their own food.
- 227. Q. Well-to-do cultivators build their own wells?— Yev; they semetimes have to borrow money from the sencers for these wells.
- 228. Q. What interest do they have to pay to the concurs? Not more than Re. 1 per menth per hundred.
- 220. Q. What there a common well costs—In the eastern part of the district about lie, for or lie 60, because in these parts after as creater soil; simple thinging is required. A avail well can be up to for lie, 60.
- 270. Q. Ikes it carry one most Yes; the arrange would to about Re. 100 for a consens will; a tuo-most well full over about Re. 220 to Re. 200.
- 231. Q. Hen many acres will one of these wells irrigate?

  —A well with one cut will irrigate two acres of regardine and six acres of other crops, that is in particular villages, penetrals about 14 to 2 a res of engarants and 2 or 3 acres of other crops. Irrigate a by wells requires 4 to these.
- 212 Q letter a confidently amount of manus well not be the least of the least they don't not repulsive country there is sugarance with a february that the description is then the sugarance with a february.
  - 188. Q. Dother we oil calm?—I'm.
- 224. Q. Of what odf-Caster off, saffener, kernnif at describing fi brought from Diarner
  - 295 Q Tatte menti-Yes
- 200. Q. Can we, which of anything that Generalization do noticle likely to amount of the people to build nell's more than they are attentively sold to be Tropy should be given alreads with intended interest as well as within a much promote for expansion, bimply digging a wall dies not impute at least to 5 years to bring the land into anything at least to 5 years to bring the land into anything at least to 5 years to bring the land into anything in patient, ander thought for a first that invest the allowed the cultivator without interest and after that a must be taken by instalments.
- 257. 12. 11: Interest is not very ligh-5 per cent. -Pera collisioner it belight the instalments too must be
- 20%. Q Itayou is in that the instalments should be spread aver a large number of years I-Ves; that usual related to
  - 239. Q. How many years f-Certainly not less than 15.
- 240. Q. Sopposing Government were not to so, for regagainst of the principal at all lut instead of that took fall garden as comment.—That would indice them to dig 11 + 1 le.
- 231. Q. How much can Gevernment safely take on a well that of me lie 200 —Al out lie. I per arreg I think the restal infrated area only should be changed.
- use. Q. (Mr. Hilele.n)—Every year f—The average of two or three years might be taken.
- 213. Q. (Mr. Muis-Mackenzie)—A well that evits Re. 2-10 acris irrigate two and a ball some of expansive and four arms of other cross i—Yes.
- 244. Q If Government tools no wore than Be. 12, would that be sufficient -- I do not think it would impact

four acres of other crops; it would irrigate two nores of sugarcane and two nores of other crops, double-cropped; Government should only charge for the orea that is actually irrigated.

245. Q. If Government charged on the area irrigated would that he too much ?—No; core should be taken that if the well fails and there is no crop grown no assessment is charged.

216. Q. Were many wells cleared and put in order during the famice?—Not many; there is nothing to put in order in these parts because there is very little silt; the repairs are very small.

247. Q. Is there any desire to construct wells on the part of the cultivators in other parts of the Decean?—In the Poon district the onlivators are keen about wells; I do not know about other districts.

218. Q. Yon way Rs. 16 an ocre is the cost of preparing land for irrigation P-Yes.

249. Q. What would it cost a man to take two or three waterings for monsoon crops?—Rc. 1.

250. Q. He does it bimself?—Yes; he does not employ labour; he works the channel by plough and it costs nothing.

251. Q. What measures would you recommend to provent damage being done to wells by irrigation and to stop profusion of waterings?—It would require a bigger establishment. Our inspecting staff is insufficient for the purpose.

252. Q. (Mr. Ibbetsen)—Do you know the whole of the Poena district fairly well?—Yes, the whole of the costern part, right up from Khed.

258. Q. I suppose the only place where a well could be profitably mode is where the soil is fit for well irrigatioen. You could not make wells everywhere and make them pay?

254. Q. In what proportion of the whole tract do you apppeas a well could be made profitable, supposing, you had plenty of money?—Not in more than 13; my coloulation is very rough; but it is not more than 13 certainly.

255. Q. Why do you put it so low P-Because the tracts are very high and the rivers are very low.

256. Q. (Mr. Muir-Mackensie)—Do you consider the present system of assessment is as satisfactory as it could be?—I have not considered that question.

257. Q. Do you think the rates on the Nira might be raised?—On the Mutha they are just right; if they are ralsed I do not think irrigation will increase. On the Nira there is some scope for roising the water-rate a little.

258. Q. On the rabi and monroon crop !- Yes,

259. Q. Do you prefer to have orop-rate to consolidated rates - I prefer a crop-rate.

200. Q. Why? - If all crops got water at the same rate, it would be very difficult to work the canal.

# TWENTY-THIRD DAY.

# Poona, 19th December 1901.

WITNESS No. 52.-Mr. B. A. BERNDON, I.C.S., Acting Collector, Ahmednagar,

Memorandum by evitness.

### GENECAL.

. The gross area of the district is 0,590 square miles or 4,216,215 ners, of which 3,166,251 ners are culturable. About 11 million acres are cultivated in the khorif season and 11 million acres in the mbi. The population is 837,741 with a density of 127 to the square mile.

Soil.—About one-third is black soil of varying quality and the remainder ranges from red to light sandy. The area protected by Government irrigation works is 6,000 acres; by elllege norks 7,000 acres (average of last six years); and by welk 19,000 acres (average of last six years). The average monthly rainfall in the district for the ten years (1886 to

					Inche	centr.	
January		•			0	16	
rebruaty			•		0	17	
March					0	20	
April		•	•		Ó	14	
May	•		•		1 1	7	
June				•	4	ភិព	
July			•	•	3	90	
August		•			2	97	
September					G	82	
October		•		,	3	77	
November					1	10	
December				•	O	64	

the annual average being 25.10 inches. The rainfall since 1965 was as follows:

					Inches.
1696					20:40
1507		•	•	•	22.61
1898		•	•	-	18 93
1890 .	•	•	•	•	19 2
1900	٠	•	•	•	15.62
1901	•	•	•	•	17·22 (ap to 17th
					Narambar).

Ordinarily there is no demand for water during the monmon (if favourable). The principal crops which require irrigation are:—

Sugarcano	•	40	waterings	from	April to February.
Wheat .	. •	_8	21		Novembar to March.
Ground n	nts .	_	**		June to February.
Juari .	•	ũ	n '	,,	October to Fobruary.
Gram .	•	5	17	12	October to Jonuary.

The average area under each of the principal rabi crops Mr. B. A. in thousands of acres is :-- Brendon.

Irrigation from Government works is controlled by the Inblic Works Department and the revenue is realized in the shape of a special rate collected in two instalments by the Revenue Department but separately from the land revenue. There appears to be no obstacle to the extension of irrigation nrising from spyrally of population, insufficiency of cattle or manure, unsuitability of soil or fear of enhanced ossessment. The necessary enpital for the cultivation of more expensive crops would be fortheoming if the water were made available. The uncertainty of the supply is a defect which applies only to wells and village works. Large irrigation works could be made with a reasonably recure supply. The law lays down that at a Rovision Settlement the increase in the value of land or in the profit of caltivating it due to improvements effected during the fermer settlement by the holder shall not be token into consideration in fixing the revised assessment. As far as I am aware, this principle is followed in practice. I do not think the fear of enhanced assessment enters into the farmer's calendations in deciding whether he shall build a well or not. Generally apparing, there are no tenous with leases in this district. The land-holder outlivates ble own holding. Lanes noder the Land Improvement Leans Act are freely offered and taken. More could, I think, be done if the preliminary enquiries and the distribution of the money were entrusted to a properly organized establishment with nothing except taken work to do. The rate of interest is low enough and I do not recommend a reduction. The lowest rate at which land-holders with the best scourity can borrow in the unarket is 12 per cent, and the usual rate in 21 per cent. A remission of the interest was granted during the recent femines, but I do not recommend this in ordinary years. I would recommend a partial remission (not a total remission) of the advance in the case of failure to obtain water. No extension of the prelice of repayment in necessary. The rules already allow

a takari loan and requires more money to complete the masonry. No irrigation works have been constructed during the recent famines by the Revenue Deportment. The

Mr. N. Vishnu,

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protective value of the completed irrigation works in this district was very small. The effect upon the numbers in receipt of gratatious relief or of employment on work must have been infinitesimal. Gratuations relief was found necessary in oil villages; and it impoened that relief works were opened in close proximity to the villages protected by these irrigation works. This, however, was fortuitous.

#### VILLAGE WORES.

There is a considerable number of temperary dams (bandhāras) thrown neroes streams in various parts of the district, but chiefly in Akols and Parner. These have all been constructed by the villagers who due their own clanacis and control the distribution of the woter. There is only one instance of Government assisting such works. The aggregate extent of cultivation dependent on such works is about 7,000 acres. The figures for the last six years no:

1895-1896			16,928 neres.
1896-1897			10,649
1897-1898			6,921 ,,
1895-1899			4,884
18!:9-1900	•		880 "
1900-1901			516

showing the extent to which streams have failed in the recent droughts. Land found at the settlement to be irrigable from these claumels was classed as "patasthal" and assessed with regard to both sail and water. The water and soil rates are consolidated, and it has not been the practice to grant remissions of the water-rate when the water fails. In my opinion the rates should be separated and the Collector given power to remit the water-rate when water fails. The only new work of this class constructed of halo years is a bandhara constructed by a missionary near Vambari. The work has only just been completed and has not yet been it lized. The fails of the District Local Board are not sufficient to couble it to construct works of this choracter. Gevernment has not sailsted the construction of such works either by the District Local Board are not sufficient to couble it to construct works of this choracter. Gevernment has not sailed the construction of such works either by the District Local Board are by inad-bolders, though no doubt the taking rules admit of loans being made to land-holders for the purpose. The supply of water in these channels is unmutained in a year of ample rainfall until January; in a year of scanty rainfall until November; and in a year of drought the supply finils alloge ther. Irrication from private channels is often supplemented by well-irrigation. The people have a theory that canal water is too cold for the land and that well water is warm and counteracts the bud effects of causal water. In this way fields are sometimes overwatered. The approximate average nanual rate changed by Government for the use of water taken through these private channels is \$12-13-0 per agree.

\*Note, It vates tram Besso in The rate is paid on the area found irricable at the paid on the area found irricable at the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the se

Note. It vates true 8000 in The rate is paid on the Akola 1; Ro-tie in Jamkhel.

area found irrivable at the interest of the interest of the settlement. The landholder incurs no expense in bringing water to his fields through these channels. He supplies the necessary labour bimself. I think that probably all the streams with sufficient flow are already provided with bandhirans. I doubt if there is room for mony new bandhirans. Many of the old dams, however, require repairing, and Government might nestally undertake the recens which the vallagers of the present day oppear to be ino divided or too last to undertake. But, as those works depend entirely upon an uncertain rainfall, their utility is limited. The only stope for further and n-eful enterprise in this direction lies in making larger unbanktoents neroes nallahs which earry off flool waters.

## TANKS

The only tunk in this district is the Bhatedi tank, which is under the control of the Pablic Works Department.

# WELLS

The area irrigated from wells in the last six years is as follows:--

1895-1996	.,		•	65,795 acres.
1896-1897	•			120,581 ,,
1897-1898				96,809
1808-1899				100,939
1400-1900				101 289
1900-1501		_		59 703

. Defore the present senes of droughts began the area irrigated was 65,000 acres. In the first year of famine the mea rose to 120,000 acres. The effect of the continued

drought of the last two years is seen in the reduction of the orea to 59 000 nores, i.e., less than half of the area irrigated in the first year of drought. The number of new wells constructed annually during the lost ten years is not at present ascertainable. The information will, I hope, he available at the end of this month. The last return was for the fire years ending 1800-1897. During that period 4.870 now wells were constructed, giving an average of 974 new wells per annum. But judging from the very large takari grants under since 1996-1897, the number of new wells constructed in the last five years must be much larger. The amounts of takari loans made during the last ton years far well-construction and repairs are:—

						R
1891-1892						15,550
1892-1-93				•	•	15,225
1593-1894		-	Ī	•	•	
1594-1895	·	•	•	•	•	6,175
1895-1896		•	•	• •	•	19,020
1896-1897	•	•	•	•	•	21,560
1997-1693	•	•	•	•		4,78,301
1693-1899	•	•	•	•	•	2,03,650
	•	•	•	•		97,690
1899-1900	•	•	•	•		2,77,858
1900-1901	•	•				1.24 629

1890-1900

1 do not think the fear of enhanced assessment is any impediment to well-construction. Government advances are freely taken. There is probably scope for more being don- in this direction, but any great moreuse in the number of new wells must await the replentshing of the sub-toil water-supply. One of the chief obstacles to the freer are of taken'i lanus for wells is the indebtedness of so mony landsholders who, if they have mortanged their holdings to the full value, have no security to offer. Another is the want of a properly organized cetablishment for the distribution of the money. During the famines a special establishment has been employed, but in ordinary years the work falls on the Mandadars who have little time to devote to this duty. During the famine of 1900-1991, 23 dry nells were bored by means of jumping hear, all but three with success, and more thou 300 wells were depended by ordinary means, water being found in about 80 per cent, of the cases. The secord is probably incomplete. But the attempts were made more with a view to obtaining water for dipling purposes than far irrigation, and I have no doubt that using of the wells ran dry again. There was one case in which the jamping bar struck a spring of water which spouted up and filled the well; but this was an isolated instance. The depth of perroanent wells varies from 25 to 50 feet, and the average may be taken as 35 feet. The sopphy is chiefly from percolation and is not liable to fall in an ordinary year or eccome too saline for nee. The cost of construction varies from \$250 to \$RS 0; the average may be taken as list 400. A well mee properly constructed will last for a century. The woter is invariably drawn by a leather bracket from 1 visual by any or two pars of bullocks. The average area attached to and commanded by a well is about eight neres, of whis bite area irrigated in any one year is accut three areas. The average area it as he will be anothered, for much light of the shell red, or or part of the percentage of the balling I do not think the fear of enhanced assessment is any One of the reasons for the idea not taking mote hold is that the cost of the shaft is such a small part (about \$15) of the total cost that the people do not trouble about it. Another is the want of enterprise on the part of the people. I am not in favour of the construction by Gavernment of wells in private lands. It would cost Government more than it would the landhelder, who, having to repay the cost, would suffer. Temperary wells dag in the bods of nallahs are used to a large extent but only for drinking purposes.

- 1. Q (The President.) You are Acting Collector of Ahmednigar P-
- 2. Q. How long have you been there ?-I have noted for
- sevon months.

  3. Q. Where were you before?—Mostly in Sindh.

  4. Q. Have you had any personal experience of the famine?—Chiefly from hend-quarters.
- 5. Q.\*In your district water is taken for wheat and juari steadily when the people can get it. Would a man who started a juari crop upon the water of a bandhara or by henvy rain in October, pretty readily take it if he could get it?—It would depend on the coil; if it wan black soil, he would not want it; for light soil he would take it if he could only not it form walls. he could only get it from wells.
- 6. Q. Or from bandharas ? They nro only useful for kharif crops; in a your of good rain they hold out till January.
- 7 Q. You say in your memorandum, "There appears to ho no obstacle to the extension of irrigation arising from spar-ity of population, insufficiency at cattle or manure, unsuitability of soil." Is black cotton soil not so sleep as a rule in Ahmedangar as to block irrigation or make it unnecessary?—I think not.
- 8. Q. There seem to be several varieties? There are three, I believe reorgaized by the Gazetteer.
- 9. Q. It is generally the depth that is put before as ?— In Ahmednag is black soil is not very deep. The Gazetteer distinguishes three kinds by colour.
- 10. Q. It is your belief that water boing given, irrigation should be persued on a larger seels than it has been?—
  I think it depends on the enterprise of the people; if they ore enterprising, there would be no obstrolo.
- 11. Q. By storage of the water in the hills you could very largely increase the canal irrigation; there is not a great deal of exertion required on the part of the people; your district is fairly flat?—Yes, I understand with irrigation you must manure the soil and treat it properly; I question whether the people in Ahmednegar have enough enterprise to do that properly.
- 12. Q. Yenr population is sparse, comparatively speaking : 127 to the square mile !-- Yes.
- 127 to the square milet—Yes.

  13. Q. Ynu say, "Loans under the Land Improvement Leans Act we freely offered and taken. More could, I think, be done if the preliminary enquiries and the distribution of the money were entrusted to a properly organized establishment with nothing except takavi work to do." Would you have an ostablishment to go fram district to district?—No, you would have a separate establishment for the district, as was done in the famine; it is not always done; we have been able to advance large sums.
- 14 Q. Would you have an Assistant Collector for the purpose?—I think a Mamlatdur could manage each taluka.
- 15. Q. A ceparato Mamlatine for takavi alone ?-You might give the work to a head knikan, but for large sums it would be better to employ a highly paid man.
- 16. Q. Could the Mamlaidar du that and nothing elso ?o would be enough work for him for a couple of months in the kharif and a couple of months in the rabi sensons,
- 17. Q. It would only be forn certain number of yours?—As regards wells, I think the limit has alumet been reached by reason of the sinking of the water level; there is not much scope new; it would take two or three years of good rain for the levels to rise again.
- 18. Q. When the water is low, there is not much inducement to sink wells f -There is not much profit.
- 19. Q. You show in your momorandum 3 that the area irrigated from wells dropped from 126,681 acres in 1896-97 to 50,703 in 1900-1901, which seems to point to the drying op of the wells. I suppose the dearth of cattle lms had something to do with that?—There was not a very great dearth of plough eattle; the famine did not have much effect on the wells; in some places the famine gave a great impetus to wells; they domand wells now; but the question is whether there is much object in bailding them, is they give out in the hot weather.
- 20. Q. According to your figures, they did very good work in the first two years from 1898 to 1900?—Yes,
- 21. Q. You say that wolls hold out a year after bandharas had failed; that shows they exercised some influence over the situation P—Yes.

- 22. Q. (Mr. Ibbelson).—Is the 24 million neres referred to in your report oulturable or cultivated?—One hundred thousand is coltivated.
- 23. Q. (The President.) You say talking about takavi, "the rules already allow a period of 20 years, though in practice the term is frequently not made as long as it might and ought to be;" why is that?—I don't know; the Manulatdars have a tendency to contract the term that could be rangeded by accounting orders. could be remedied by executive orders.
- 24. Q. You say only one new bandhara has been constructed P—Yes, that is on an agriculture farm belonging to the American Mission by Mr. Bulluntine, a very enterprising
- 25. Q. Yon say, "Irrigation from private channels is often supplemented by well irrigation. The people have a theory that canal water is too cold for the land, and that well water is warm and counteracts the "bad offerthe canal water." Do they pump the worm water after the cold ?-Yes,
- 26. Q. And thereby give too much water?—I have no personet experience of that; I have been told so.
- 27. Q. You say, "The only tank in the district is the Bhatedi fank, which is under the control of the Public Works Dopartment." Are there remains of old tanks or any indications that it was a tank district?—No, I believe come village tanks were constructed in the famine of 1876, but they have all gone out of use.
- 28. Q. (Afr. Ibbetson.) Is that for drinking or irrigation?—I am not sure; I think for drinking for outile.
- 29. Q. (The President.) They have not been kept up?—Nu, pruhably they were not well constructed.
- 30. Q. Takavi loans are given for many things besides wells; what are they chiefly P-Seed and cattle.
- 31. Q. (Mr. Muir-Mackenzie) Are they ever gifor manure?—No, I think not; certainly not expressly.
- 32. Q. (The President.) Is any artificial manure used?
- 33. Q. (Mr. Muir-Mackenzie.) Not easter oake ?-
- 31. Q. Nor fish mannro P-I won't answer that In the negative, but I never heard of it.
- 35. Q. (The President) You say in your note "the massessment on laud irrigated from wells is not much higher than the dry erop rate. It ranges from Rs. 2-7-0 in Akola to Rs. 0-6-0 per agree in Knjat." That is extremely low?—Yes, it is very low throughout the district. Karjat is a poor taluka. That paragraph refers to land rejected on wells. Karjat is about the warst part land irrigated on wells. Karjat is about the worst part.
- 36. Q. Who there great loss of life in Ahmednagar during the famine?—The last census shows a decrease of 50,0.00, but I think a large proportion of that went to the Nizam's territory; the decrease was chiefly in the border talukas; at that particular time labour was to be got in the Nizam's territory.
- 37. Q. From your experience what do you think would be the hest protective measure for Government to adopt to make your district better fitted to withstand a famine, than it was three or four years age ?—I think there is only one, to utilize the streams and nullahe.
- 33. Q. That is, to store the water instead of allowing in to go to waste?—Yes.
- SD. Q. (Mr. Muir-Mackenzie.) You would not advocate the multiplication of wells?—Cortninly not at present. I think the sub-soil water will not rise for come years ; it is sinking fast.
- 40. Q. I suppose that materially diminishes the number of wells working !- Yes.
- 41. Q. (Mr. Higham.) Can you say what is the actual area cultivated in Ahmedangur in the worst famine years?— I'm nfraid I have not the bgures.
- 42. Q.—I suppose there are figures?—(Mr. Muir-Mackenzie.) Only figures of the area sown could be given, not of the area that comes to maturity.
- 43. Q. With reference to the bandharas that you refer to, what rivers are they situated upon P-They are situated on streams, tributaries of the rivere, not on
- 44. Q. There are none for instance on the Mula river ?-I canuot say.

Mr. B.A. Brendon.

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Mr. B. A. Brendon. 19 Dec. 01.

- 45. Q. (Mr. Muir-Mackenzie.) Are they palkaban-dharas or kachcha?—They are kachcha; they have to be ropoired every year; they are kept up by the villagers.
- 46. Q. (Mr. Higham.) In the event of storage works ing constructed, the immediate result would be to greatly these bandharas, hy giving them a regolar —Yes, if you had bandharas on streams.
- 47. Q. Suppose you had a bandhara only a streom at the head of which you could construct a storage work, the efficiency of that bandhara would be greatly increased, but would Government have any means of getting any revenue on account of that. The revenue is fixed on this bandhara!—Yes, there is a coosolidated revenue on the bandhara.
- 48. Q. If we were to store water at the head of the rivers the bundharas would get u much hetter supply, and we would he able to get nothing out of them; they would get the first pick of the extra supply?—I suppose so.
- 49. Q. (Mr. Muir-Mackenzie.) If there was un in oreased area brought under oultivation, Government would be able to chorge revenue on that?—Yes.
- 50. Q. (Mr. Higham.) You say that the approximate average annual rate charged by Government for the use of water taken through these private channels is Rs. 2-13 per acre. That includes the soil tote also ?—Rs. 2-13 is the whole rute.
- 51. Q. I see that Mr. Lamb very strongly recommended the construction of the Maladevi tank; do you egree in his opioion that it should be donof—Entirely.
- 52. Q. Do you think if the Maluderi tank was constructed and a regular supply down the Prawara river, there would be any demand for water in ordinary wet years?—I think experience says no. I suppose there would not he very much demand in a good year.
- 53. Q. People can got very good crops without irrigation f—They can get enough; they are net ambitious.
- 54. Q. Don't you think they would endoavour to fotro-duce a higher class of crops if they could get an assured supply of water?—Not on a very large scale.
- 55. Q. You think the muse of the people would be centent to get their crops without paying a water rate?— I think so; I think they would noly toke water ou a large scale if rain threatened to fail.
- 56. Q. What do you say ubout the Visapur tank f-I suppose the same remark holds good.
- 57. Q. I don't mean whether the people would take water, but whether it would afford any protection at all?—Undoubtedly; I think the tank will fill.
- 58. Q. Do you think it should be completed ?—Yee, nn-doubtedly.
- 59. Q. How long hove you been in the district?—Ten months altogether.
- 60. Q. Have you seen auything of that work ?-Yes.
- 61. Q. As a relief work, has it been a good work for em-ploying labour on f-Capital; we have had 11,000 people on it far a long time.
- 62. Q. Would you like to keep it in reserve for another famine or complete it at ouse?—I should complete it ut
- 63. Q. (Mr. Ribetson.) You said just now that in a good year people would be content without irrigation?—That is my private opinion.
- 64. Q. Can you give us any idea what proportion of years would come under that description of "good" years; ont of five or ten how many ?—No, but the had years come in cycles in Ahmedusgar; the last eix years have been ull bad
- 65. Q. We have been told that in the Deccan out of five years there is one good crop, two middling, and two bad; doce that apply to Ahmednugur?—Yee.
- 66. Q. Does that apply to the rabi who; do they grow their rabi ordinarily on rain only F-No, only the best soll grows rabi without rain; at the ond of the year their rabi has to he irrigated from wells.
- 67. Q. Supposing water was available from n tauk or caual, would they toke it in au ordinary year?—Yes, for the rabi.
- 68. Q. Do you think that the rabi area could be extended if they had plenty of water?—I think it very likely if they were not hard pressed; when there is a famine, they try to get some crops at onco.

- 69. Q. You say in your note "I do not thick the fear of enhanced assessment enters into the farmer's calculations in deciding whether he shall huild a well or not." Do you think that thot consideration does not weigh with him one way or the other, or is it the case that he has no fear that there will be cohancement?—Purtly both, partly because he is reasonably sure of making enough profit.
- 70. Q. You don't think he knows forcertain not only that it won't be high, but that there won't be uny at all?—I don't think he knowe the law.
- 71. Q. Still you don't think that such fear as he has ever prevents him from making a well that he would otherwise moke?—No.
- moke?—No.

  72. Q. Yon eay "I would recommend a purtial remission (not a total remission) of the advence in case of failure to a that in water." We have been told by many witnesses that they object to that on the ground that it would lead to extensive frand; it would be impossible to find ont how much the man really spent on the well or on a marriage; etc.; do yoo think that would be a practical obstacle?—I think not if there was a exceial officer who had time to enquire into these metters.
  - 73. Q. Do you think an enquiry should be mode?—Yes.
- 74. Q. Your wells irrigated 65,797 acres in 1895-96 and 126,581 acres in 1896-97; that was a fumine year !—Yes.
- 75. Q. Does that mean that your wells had not been fully worked before or that o great number of now wells had been dug f-A very large number were dug.
- 78. Q. Then they must have been made kachoha !--Yes; they struck rock very soon.
- 77. Q. You say in your nole, "A grant-in-nid might usefully be given to a man who has alreedy dug a well by means of a takevi loun and requires more menoy to complete the masonry "P—That seems to me u most admirable soggestion.
- 78. Q. (Mr. Muir-Mackenzis.) Do you meon without repoyment?—Yes.
- 79. Q. (Mr. Ibbeison.) Can you say how many of these wells in 1896-97 were dug quickly and left just as they stood?—I cannot say.
  - 80. Q Were many left in that way P-I cannot say.
- 81. Q. You say, "No irrigation works have been constructed during the recent famices by the Revenue Department. The protective value of the completed irrigation works in this district was very small. Which do you refer to?—To the Ojbur left bank und the Lakh canal, also the Bhatodi Tank.
- 82. Q. What happened to thom that they were not a success ?—The water-supply failed.
- 83. Q. I suppose there was some woter ?—I think not; the supply failed early.
- 84. Q. You say, "The approximate average monual rate charged by Government for the ose of water taken through these privule channels is Rs. 2-13 per acre." Can you say how much of that is for water and how much for land revenue P—No, the figures are available in the village records.
  - 85. Q. Is that consolidated !- Yes.
- 86. Q. We have heard that Re. 1 is taken on account of water; do you think that a substantial reduction of that would stimulate the construction of these kachcha bandharas?—No; there is no co-operation among the people.
- \$7. Q. As a fact, they do make these bandharas; why should they not control their distribution in more cases?—Becone there are no more streams, there is no more room; whatever little water there is is taken up.
- 88. Q. Have these streams been examined professionelly? No, my point is that there is no more bandharas, not that there are no more sites.
- 89. Q. You soy, "Muny of the old dams, however, require repairing, and Government might usefully undertake the repairs." What is the use of them if the water is already repairs." What is the use of them if the water is already taken up?—Well, I think it is possible some of these would be more useful if they were thorughly repaired, the villagers are not intelligent enough to repair them themselves.
- 80. Q. (Mr. Muir-Mackenzie.) I understood they were all kachcha i—Yes; I believe so, there ore two dates in Akola, which have heen repaired by the Public Works Department; the Savagoa is one.
- 91. Q. (Mr. Ibbeisan.) Would these bandharas be second class irrigation works f—(Mr. Muir-Mackenzie.) Not unless they are in charge of the Public Works De-

15.4

- 92. Q. Can you suggest any reason why tank irrigation is practically unknown in Ahmednagar ?—I suppose it is the conformation of the ground.
- 93. Q. Have you any country which prima facie would be suitable for tanks?—Do you mean tacks like these in Konkan for storage of roin water?
- 94. Q. I mean some with cotohment orens of their own ?—I think there are pleaty of sites.
- 95. Q. Why are they not made use of as is deno elsewhere?—I suppess they were beyond the moons of the people.
  - 96. Q. Do they grow rice P-Yes, in Akola only.
- 97. Q. Are there my tanks in Akola?—No, my opinion is that a couple of good showers would fill ony of these village tanks, but they dry up quickly.
- 98. Q. You say in your note that something like 1,000 new wells per annum hare been made in the last five years?—No, during the five years ending 1896-1897; since that year 8,300 wells have been dug.
- 99. Q. So that wells were increasing at the rate of o thousand a year before the bad oycle came?-Yes.
- 100. Q. Looking at the coop of well irrigation and the fact that more labour, more calle, and more manure are required, do you think that that rate of a thousand per your could have been advantageously increased very much, supposing there was plenty of money available?—I dareasy I find that of the wells made since 1896-97 only one-well were made from taken and the vest from private capital.
- 101. Q. One would think that the famine would apply a strong stimules to the construction of wells ?—It also dries up capital.
- 102. Q. De you think that the number might have been largely increased if money had been freely available?—Probably more wells would have been constructed, but I doubt if the advantage would have loon great, because the mater level has been sinking so much.
  - 103. Q. I suppose a wall protects about 3 nores?-Yes.
- 104. Q. I suppose there are large tracts in Ahmedeagar in which wells could not have been sunk, or profitably worked?—There may be fields, but not tracts.
- 105. Q. Do you think over the greater portion wells could be sunk and worked with profit if people had the enterprise and money?—I suppose they could if there was a supply of
- 109. Q. Supposing you made all the wells that a man could desire and that he could work with profit, what area could be protected; is une-tenth rory much below the mark for Ahmednagar?—I question whether it would be more.
- 107. Q. You say in your note?—Any great increase in the number of new wells must awoit the repleuishing of the cob-soil water-supply." That means until the present cycle is over and we get better years?—Yes.
- 108. Q. Have you experienced the anti-soil water-supply failing not on account of bad years, but broanse too many wells have been made close together?—No. I have not studied that question.
- 109. Q. Have you beard of it ?- I have always assumed
- it as a fact; I have you heard of it?—I have always assumed it as a fact; I have not enquired into it.

  110. Q. You say, "Expert salvies has not been provided, nor is it education that it should be provided." You say you have a boring machine already; is it for deepening a pit already deg?—No, it is a drill for trial boring.
- 111. Q. That has not been n success?—No, because it is so fragile. I think a long jumping bar is more suitable for a trial horiug.
- 112. Q. Supposing that the machinery is simple and effective, would you say it is not advisable to get it?—You would want such a number, you cannot carry these things alout like we jumping bar, and you would require skilled aupervision.
- 113. Q. Would you recommend the p jumping bar!—We have one in every taluka. provision of a
- 114. Q. Are they much used?-It depends on the Mamiatday.
- 115. Q. D: you think people appreciate the use of them?—There is not much competition for them.
- 116. Q. Has there been a case in which it has been really useful and where loss of money has been prevented?—I cannot say.
- 117. Q. (Mr. Rajaratva Mudaliyar.) You say, "Tho areo protected by Govorument irrigation works is 6,000 acres."

- .Do you mean by that protected in all sonsono, or do you refer to the irrigable area only f—It means the area actually irrigated. I soppese commanded is the proper expression.
- 118 Q. In o formins year the whole of that area will not 19 Dec. 01. be irrigeted P-No.
- 119. Q. You say "the rate of interest is low enough, and I do not recommend a reduction. The lowest rate at which lendholders with the best scenrity can borrow in the market is 12 per cent." We have been told that agriculturists find difficulty in borrowing owing to the power of alienotion boving heen restricted. Is there any truth in that etatement?—It is too early to say yet; I think the matter will right itself; there has not been much horrowing since the Ast was record. borrowing since the Act was passed.
- 120. Q. It is dee to the famine? Quite es mech us to the recent Act; partly, too, the season of making wells in only now coming ou.
- 121. Q. (Mr. Muir-Mackenzie.) As a matter of fact, the area on which alienation was restricted in your district is insignificant?—Yee.
- 122. Q. (Mr. Rajaratna Mudaliyar You say, "I hand foundnt the estilement to be irrigible from these channels was classed as "patasthat" and assessed with regard to both soil and water." All such lands are, I suppose, liable to pay a consolidated assessment, whether irrigated or not?—All those found irrigable of the settlement.
- 123. Q. Is any large portinn of the land left unirrigated P-No, I think not; if they cannot got water, they can apply to the Collector, and with the approval of Government got the consolidated rate removed.
- 121. Q. What would be the reduction in the consolidated assessment in such a case?—I think the water rote is represented by about Rs. 2.
- 125. Q. You say "the approximate arroge annual rate charged by Guvenment for the use of water takes through these private changes is Rs. 2-13-0 per nore," and you explain in a marginal acts that it varies from Rs. 6-8-0 to Rs. 0-11-0, aby does it vary so much?—(Mr. Muir-Mackenzie.) According to the character of the supply.
- 126. Q. Supposing that a rayat brigated a portion of rivate had by means of bandhara constructed at his own cost, what would be be charged?—The rule is that an officer goes and inspects the bandhara, discovers how long the apply is likely to last, its capacity and the area irrigates; he then puts on a rate conforming to that of similar bandharas that were assessed at the last settlement in the vicinity.
- 127. Q. Referring to the Bhatodi tank, I find the revenue is given in Mr. Beele's statement as Rs. 5,799, while the working expenses amounted to Rs. 7,723; what is the reason of that f-I think the silting up of the tank had something to do with that; the Poblic Works Department will be oble to explain.
- 128. Q. Referring to statistics of area irrigated under wells, do you think the figures can be accepted as reliable?—I think the figures are approximately correct; there is a triple check on them, the figures being checked by the Mambatday, Assistant Collector, and Circle Inspector.
- 129. Q. (Mr. Mair-Mackensie.) About these wells, 1 see you have given an increase in their number between 1896-97 and 1901-02; that increase began with 1897-98?—Yes.
- 130. Q. In contrasting the number of wells that have been made during that period with the number that have been made during the five years previous, it must be remembered that a large number of wells were made in 1896-97 ?—Yes.
- 131. Q. Then ngain, I natice, that in the famine year you had 1,234 pakka wells; is that so ?—That is not for that year alone; that is a statement compiled in that year, which shows the wells constructed since the last famine sinco 1806-07.
- 192. Q. As regards manure, did you say that you noticed the people are buying cake ?—No.
- 193. Q. I think I have heard that they are; have you heard that there is any conservation of rofuse and night coul in the villages going on !- No.
- 134. Q. It is not only going on in the towns, but also in the villages they are beginning to learn?—I have not noticed it, but then I have not foured very much in Ahmedangar.
- 135. Q. Do you think that the system of assessment of rates varying with the coops, so much for rabi and monsoon crops, etc., and determining the emonant of assessment by fuspection is in every woy a suitable system, or do you prefer the Sindh system of a consolidated rote?—I think you would have to split up the numbers.

Mr. B. A. 19 Dec. 01.

- 136. Q. If you split ap the numbers?—I think the Sindh system is probobly better, as it does nway with the chones of fraud on the part of the subordinate agency. I think the management of these works by the people themselves is better if it could be done.
- 137. Q. Can you suggest any method by which it could be done?—Not on u big canul, but on villege works and small tanks; the people are certaintly better qualified to manage the distribution of water themselves.
- 138. Q. The small tanks ure under the Public Works De artmont P—Yes; for justance; the Gouda tank; the Pobli partmont?—Yes; for iustance; the Gouda tank; the Poblic Works Department repair it and the villagers muuoge it.
- 139. Q. Woold you prefer to see extended the system of village management?—Yes.

  140. Q. (Mr. Ibbetsou.)—That implies fixed assessment?—Yes.
- 141. Q. (Mr. Muir-Mackenzies)—You said that experience seems to suggest that irrigation from these Government works would not be much reserved to in good years; i want to know what experience ?—Woll, I cannot say I have had moch experience.
  - 142. Q. It is more an impression than experience?-Yes.
- 143 Q. You have never, for instance, studied the progress of irrigation on the Nira Conel?-No.
- 141. Q. You said that the Visapur tanktwould fill; what do you go upon; the aspect of the country does not seem very inviting ?—I have not studied the question; I have noticed the floods that go down; I think they are sufficiently large to fill these tanks.
- 145. Q. Do you think that was a good selection for relief labour, or would you prefor to see it concentrated on another tank, way the Maladori tonk?—Ye-, I presume I should if it wers practicable; the Maladori is certain and the Visapur is not certain.
- 146. Q Do you think the Visspur was taken because there was no alternative?—I cannot say.
- 147. Q. Is there any other form that you can think of in hich famme relief work could be employed to advance irrigation as advantageously as these big tanks?-No.

- 148. Q. What about thats lerracing the country?-I personally prefer tanks, large and smoll.
- 149. Q. Bonding up of smoll streams?-Well, I was thinking more of honding up nallahs which carry off flood
- 150. Q Would it he compatible with effective supervision do that as a famine work?—I think so ; it is a question of establishment.
- 151. Q. You think that the period of repayment of tskayi advances for well building should be extended?—I think the Mamiatdam don't make the term long enough in many
- 152. Q. Can you give any reason why a restriction should be mode; why not give as lung a term us the rayat wishes?—I think there should be a limit.
- 153. Q. Why, suppose he pays the interest?—Would that not reduce the amount of money available with Government for loan to other people?
- 154. Q Allowing that Government might have to consider that, we hear that rigidity in the collection of installments is one of the great drawbacks to the system, so long as the interest is paid, why not allow the rayat to postpose the rapayment of his instalment; do you think he would look upon it with satisfaction?—I think he would! I was thinking the abjection from a recover point of size at the abjection from a recover point of size at the abjection. ing of the objections from a revenue point of view; I have not considered the question.
- 155. Q. (Mr. Ibbetson.)—Cnn you say what the ordinary cultivator has to pay for loans from a bania to make a well?—Generally by 24 por cout.
- 156 Q. Have you given takevi this year for wells?—No not yet, the time is approaching.
- 157. Q. Do you propose to lengthen the period for recovery beyond what the Mamiatian recommends f-I propose to issue orders to the Memlatdar to that effect.
- 158. Q. The Collector has full power ?-Yes up to 20

WITNESS No 58 .- REVD. H. FAIRBANK, American Mission, Vadala, Taluka Novasa, District Alimediagar.

Answers to printed questions.

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- 2 The soil in the Ahmednagar district varies from heavy black soil to light and sandy. In an ordinary good rainy season no portion of this soil is dependent upon irrutation except for special crops, as so arcenc, lucerne, etc. The kharif or tany season crops are planted from the 1st of June to the end of July in the light soils, which require repented rains and which do not become unter-logged. The rabi crops of juari, wheat, and gram are sown in September and October on the heavier black soil, which needs no rain to develop a crop if it is once saturated. Cotton is sown in June on black soil and flowers in September and October. The kharif crops no not untered in ordinary years. Juni and wheat are both untered whenever it is poscible to do so. Juari is watered three or four times, November to January. Wheat needs more unterfit is watered at all. Both juari and wheat give good returns on black soil without irrutation. By watering the yield may be doubled and the circ and weight of the grain may be very much increased. Crops that must be watered are segarante vegetables.

  3. There are no tanks that I have seen constructed in
- 3. There are no tooks that I have seen constructed in B. There are an arms that I have seen constructed in deep black soil. Thore may be a black soil embrakement, but the hottom needs to be rocky. (There are small tanks at Bhamani, Yadala, Takli-Bhan, Bhokar, etc.) None of these tanks are used for irrigation, but are osed to supply diinking water to entite and for bathing. Even in the richest black soil justi and wheat are irrigated, if possible. The owners of fields along the Lakli Canal we water whenever there is evonets. In good years it is used meter whenever there is e-sough. In good years it is used freely. In years of drought it would be used still more freely, I have no doubt, if the supply were abundant. Irrigoted huds need plongbing often and to be manured; otherwise they soon are exhausted.
- 4. The only work of importance that I personally know of is the Lakh Conol. This canal has little water in times of drought. Tanks such as are now being built or proposed near the sources of the Mula and Pravara promise to be

- of great use ia storing water for other reservoirs forther down the stream.
- of great use is storing water for other reservoirs farther down the stream.

  6. There are no small tanks in this district used for irrigation. Those now in existence supply dinking water to cattle. There are not any of them, as far as I know, of Government construction. Some are the pits of quarries. The configuration of the land prevents the construction of large touks escept at the base of bills or in the teds of rivers. Tanks at the base of the hills extending cast from Yambort would be useful for Irrigation. Inthe hilly districts of the Parner and Nagar talukas such tanks should be feasible and useful. The rivers generally run very low compared with the surrounding territory, and can is from them would be limited in neftulness. Storing water at intervo's in these rivers would solve the purpose of supplying water to wells mear the riverside. Soch wells were used very freely in 1897 and 1898. Since then the rivers have run dry, and the bludkis, as they are alled, have been usels. Dams at intervals across the many streams that run from the hills on the south to the Muln, the Pravna, and the Godavara Rivers would have been of matold value during the last five years, for an enormous amount of water runs to waste through these streams. The channels of these streams are deep and narrow at many places. As already mentished, the small tanks scattered through the district have been useful in supplying water for cattle. They become so foul that men will not drink the water.
- 7. Wells supply practically all the water used in irrigation in this district. In addition to wells existing before the familie, many new wells have been dup by means of takuvi loans, and aid wells have also been despend. It is a pity that many farmers have squandered the loans given them, but etill the amount of good accomplished has been great. It should be remembered also that wells are expensive, and that 500 rupees may be practically useless without another 100 rupees to finish the job. I know of wells that are built up and in which there is a little water.

Another lean of a lundred rupees would probably make these good wells and double and troble the value of the land; without this sum, the well does nothing. Improper ase of takavi leans may be partially prevented by giving the money in inetalments and requiring the first inetalment to be properly used before another is given. It should be remembered, however, that some of the first instalment of takavi invariably goes into the podects of the patel and kulkarnis. Towas favoured by goed wells have preserved their cattle alive, and their inhabitants have not been on relief camps, e.g., the town of Jenr in the Nagar taluka and the towns along the Sina River below Almodangur. On the other hand, wells have their limitations. The last two years have seen a great diminution in the amount of water in the ground. Some wells have dried up altogether, and the capacity of most has been reduced to one-fourth, or even less, of the ordinary capacity. The ground seems to have dried up clear down. Some wells have been deepened with excellent results. The majority of those deepened have been helped Wells 60 or 70 feet deep are profitable if they have abandant water. In sume towns water lies within 20 or 25 feet of the surface; such towns are few. The average well is over 30 feet, down to 50 feet, deep. A good well cannot be dug for less than 500 rupees ordinarily. Many cost up to 1,000 rupees. A well that will water 10 acres adequately is rare. It should be remembered, however, that sugarcane and gardon vegetables need very much more water than juari or wheat. So the statement as to the amount of land that one well will water depends on what crops are meant. There are one or two wells that I know of that are as id to water 20 or 25 acres, but a great part of this land is in juari and wheat. There is not an unlimited amount of water is the ground. An increase of wells in many cases decreases the supply of old ones near by. This is especially the case when there is a porcus similum through which the water comes. There is plenty of r Another loan of a hundred rupees would probably make there

#### II.

# A .- GENERAL.

I have knowledge of the Nevasa teluka in the Ahmednagar district and of parts of the Nagar teluka.

- 3. There is no obetacle to the extension of Irrigation-
  - (1) from eparsity of population,
  - (2) from insufficient supply of cattle.

There is an obstacle at present because cattle have died in the famine. Befure the famine there were enough.

- (3) At present manure goes to waste. Increase of Irrigation will bring in more cattle and increase the amount of manure.
- (4) Seil (even black cotton) is suitable for irrigation if worked proporty and manured.
- (6) If the supply of water were insured, I believe that there would be capital to invest. There might be trouble about the initial expenditure in the present poverty of the farmers.
- (7) No one ever has meationed this fear to me.
- (8) Not that I know of.
- (9) Wells are exponeire to operate, and this does in good your prevent extension of irrigation for the more expensive crops as sugarcane, etc. The fact that farmors have not credit with money-leaders on account of laws ouncted in 1879 and lately is given as a reason for their not being able to obtain money when weeded

- 5. Loans have been freely taken by the peopls for dig-ging wells; and a great many wells have been dug.
  - (1) Perhaps the rate of interest could be reduced.
  - (2) The interest should not be entirely remitted.
  - (3) and (4) Remission, partial or total, in case of failure to obtain water might be a good thing for those who have honestly tried to use the loan, but the trouble would be that a general policy would lead to abuse of takavi loans.
  - (5) I believe that the period of repayment of present loans should be extended on account of the distress caused by the famine.
- 6. Extension of irrigation has not, as far as I know, tended to injure the remaining cultivation.

The increase of irrigation is greatly desired.

#### E .- WELLS.

24. In the Novasa taluka-

- (1) Wells average from 30 to 50 feet doep.
- (2) Water comes both from epringe and from par colation according to the nature of the

They do not fail except in severe drought. There are tracts where the water becomes too saline to use. Such ore avoided by the people in digging new wells. Any well will gradually diminish in capacity through the hot weather oven in ordinary seasons.

Wells through this district within 12 mouths have very seriously diminished in capacity. Many have only ene-fourth or less of the water of ordinary years. In some towns wells have practically dried up.

- (3) Wells cost from 500 rupees to 1,000 rupees.
- (4) A well once built should last for ever.
- (5) Water is drawn here always by a leathern bag called a mot.
- (6) The capacity of a well is measured by the number of mote that can be used on it.

One mot will water 3 or 4 acres of juari or wheat, but less than half that of sugarcane or garden vegetables.

- 35. Irrigation increases the value of the produce.
  - (1) Iwo harvests are possible. Generally bajri or khondi is planted in the rainy season followed by wheat or gram.
  - (2) Sugarcane and pea-nuts, etc., are substituted where the farmer can bear the initial expense.
  - (8) The yield of junri and whoat is increased, and the size and weight of the grain are increased.
  - (a) In a your of ample rainfall, the yield is sometimes doubled or at least becomes half as much again.
  - (b) In a year of scanty rainfall, instead of a poor crop a good orep can be obtained.
  - (c) In a year of drought, in place of nothing a fair erop at least may be obtained.
- 88. (1) Where there is ruck to be blasted, there the dig-ging of a well is a kind of lettery. You may strike a spring and you may not.

When there is a porous and soft substratum, there a well can be sunk almost anywhere, and water obtained.

- (2) Wells dug in deep loose soll are difficult to wall up.
- 40. Temporary wells are not in use in the Nevasa taluka, because the water lies too deep below the surface.
- 1. Q. (The President.) You are, I understand, a Missionary in Vadala ?-- Yos.
- 2. Q. How leng have you been there?—Siece 1886; I have bad more or less experience there.
- 3. Q. Were you there through the famine?-I was through the first famine, not the last.
- 4. Q. Have you studied agricultural matters?—My father was very much interested in agriculture, and as I go round I notice things, but I have no scientific knowledge.
- 5. Q. (The President.) You say in your memorandum 19 lu an ordinary good rainy season no portion of this soil is
- dependent upon irrigation except for special crops as engarcane, lucerno, etc."?—Yes, erops are raised anywhere in an ordinary season without irrigation.
  - 6. Q. Does that include ordinary rabi crops ?-Yes.
- 7. Q. You talk about the ordinary rainy season; up to when does that mean?—They got the heavy rains in September.
- 8. Q. If there is no rain after the 1st of October?—If the rain begins on the 1st of June and lasts to the middle of August, and then there is a break, and the heavy rain comes in September, these are sufficient for the rabi crops.

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  - 10. Q. What is the last date that they now jourf and wheat, assuming that the rains have lasted to the end of Soptember ?—June in the last week of October and wheat not before the end of October.
  - 11. Q. Will the heat of October not burn up the junei!—No, it is better to sow at the end of September, but it eyem sow it at the end of October, as seen as the ground is in proper con lition.
  - 12. Q. You have bet experience of a district that her cultural receive?—Very reverse, I have unideen quities as I touted and have not been able to district a simple death from starration, because everythely who needed it West on trhel works.
  - 13 Q. Proposition the note from the lives of the people for Yes, possible there may have been are or inducted from according to the martin state attention.
  - It Q. The may page the intensity of the facility has the head not be the trelifed as of the state of arged of where, I still the carried of teleful with that said I verified as Abrohmagus stands at the head in the matter points, a point we know would have been correctly to hear this.
  - 13. Q. Wist will time remove 14 verse us of the discrete Ah observable for each of the observable. I dead a facilities remove for evidence applied I dead to each of the sole, it is regard to state of the sole of the Visyer and Salaboutsche at the new concept hand the Younger and Applied to the attention to the Applied t
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  - 19. A. tay er director or willet come record meson In low-lying glass, but very offere both to pret with,

- NO. Q. That is not an insuperable difficulty?—No, some of the best wells are blasted through hard building rock, you often strike excellent springs.
- Ill. Q. Are you an advante for the free grant of talart to studie a cultivator to make well-f —I think taken loans have done a great dral. I have but a good dral to do with Christians, and am sorry to say that they as well as others have used the money for their jurgoses; they simply make a little but in the ground.
- have used the money for other jorresses, any simply make a little belo in the ground.

  12. Q. Ho you toink it a could be remedied by making a condition that a correln amount of work must be done before the whole amount was given in Ves, the money about La given in installments; if work is cateful out proposity, then the containing installment should be given.
- 33. (). Do you think the rate of interest Alters men from taking takes the No. all say it has most fair gat.
- its. Q. We have lat a proposal nate that instead of gel-ting reparament of i on this tar chiefs and give the advance and then it and arress the last lines at for oil future fine and then elding access the lattification for all thine time at an additional access time for wetter lede on the lattif would be predated. It this if ago, family as econoly the antance in accessment wind a net by surporting to ever the antance in accessment wind a net by surporting to ever the antance in accession. 'ol that er tille getret of it.
- 15. Q. Ye chase book that the inster level by good from any largely bodies, arry largely in the chiese whom I had by that one quarter of the odd any supply. We beautifully found and the water. Then he would be a power for a first wave unit give extreme with redry.
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- to, Q. You think that the course of apply it the earth of my low You, as parameter to be entered to a low en

- 49. Q. (Mr. Muir-Mackenzie.) You don't think they could do with less water than they take ?—Mr. Knight thinks the fields are overwatered; if a cultivator were used, less water would be needed. The trouble with sugarcone is that we account out into the fail to articlate it. that you cannot got into the field to onlile ato it
- .50. Q. Havo you boord that they water cotton ?-They sey irrigation produces disease in the plants.
- [(Th. President.) In Egypt it is watered once a fortnight teadily ?-(Witness.) I only say what I have heard.]
- 60a. Q. (Mr. Higham.) None of these public works that have been proposed, the Maladevi, etc., would be of any benefit to Vadala, would they F—Yes, the caual from the Baragae Nandur Tank near Rahuri would go within a mile of it.
- 51. Q. You say in your momorandum, "The khorif ar rainy scaron crops are planted from the 1st af June to the end of July." I suppose there is no rice oultivation?—Yes in a good season they plant a very coarse sort of rice that does not need much water.
- 62. Q. I suppose the reason is that there is generally not enough water for it ?—Ves.
- 53. Q. If a more regalar supply of water were given by means of tanks, do you suppose that any of this kharif cultivation would be converted into rice cultivation?—I cannot say. I rather think not ; instead of going into rice, they would go into sugarcane, red peppers, ground nuts, and gardon regotables; wherever there is a well, they plant these things.
- 54. Q. Yan don't think there is much danger af the land being converted into rice cultivation land ?—No, our people don't enjoy eating rice.
  - 55. Q. Da they graw cottan P-Yes, a great deal.
- 56. Q. (Mr. Mair-Mackenzie.) Is it much ?—It varies from year to year; their idea is that cotton has to he sown before the end of June, and requires heavy rain in June.
- 67. Q. (Mr. Higham.) These bands across the stream would not store water ?—Yes, they would.
- 59. Q. What beight ?- In some places 10 to 15 feet high.
- 59. Q. The water would be comply ctorage and allowed to percolate through ?—Xes.
- 60. Q. You would not lift it ant P-No, except by wells at the sides; I think, it would holp oxisting wells; the principal nee would be to help wells near by the river, I think anybody who need a hurki or a well fed by a running stream, is charged an extra rate.
- 01. Q. (Mr. Ibbetson.) Do you think that the charge for the use of water of armning stream prevents the people from using it materially !—No, it is not a high charge.
- C3. Q. Yau consider that in a good year crops can be grown anywhere without irrigation; still Irrigation would improve the crops in the best of years ?-Yes.
- 63. Q. You spoke of the uncertainty of the supply af weter; suppose the sopply was absolutely secured, do you think that they would use it in the best af years far the sake af that improvement?—Yes.
- 64. Q. If the supply was seener, they would take all the water that could be given ?—I believe so, they would then cultivate more expensive crops, but they would also irrigate the rabi crops.
- 65. Q. Yau say you have heavy black soil in Ahmednager; is a lorge proportion of the cultumble area on that ?—It is in spots and villages; it is most provalent near large rivers.
- 66. Q. Is there an extensive area altogether ?—At Vadala there is not much, at Kharvandi half is black sail.
- 67. Q. Taking the whole district, roughly ?-It would not come to one third probably.
- 69. Q. At any rate, you put it at one-fourth ?-Yes.
- 69. Q. Would they water heavy black soil?-Yes.
- 70. Q. What is the grentest depth of block soil that they irrigate?—I cannot say. Along the hills there is no black sail; there is some as you get away from the hills to the flat open country; some villages are entirely kharif and some onlitely rubi; there is kharif on the high lands and rabi on the low.
- 71. Q. You say, "Irrigated lands need plonghing often and to be manured, etherwise they soon are exhausted." Da yau say that from yaar own experience ?—Yes, one year without manure made a difference.
  - 72. Q. Is that poor soil ?- It is the richest soil we have.
- 73. Q. What makes yan think it is the absence of manure f-There is no other reason.

- 74. Q. (Mr. Mellison.) If you water black soil one Revd. H. year, you will get a gaed crop, and not the next year?— Fairbank. Unlivators say the same thing; they say manure would have prevented that.
- 75. Q. (Mr. Ibbelson.) Why, are thore no small tanks for rice irrigation in Ahmednogar ?—At Vadala I don't know af any place where you could have a tank.
- 76. Q. I mean village tanks to water say 70 to 80 acres? —I don't think you could got a place where you could otore eaough of weter and raise it to flaw aff by a ahannel.
- 77. Q. You are not hapeful about taske?-Ne, sot about small tanks.
- 78. Q. A great number of wells were made in 1896?-Yes.
- 79. Q. Do you know how far they have been finished up with mesonry as far as that is necessory? I asked that question; the village officers said three-fourths had been finished.
- 80. Q. Do yau think the romaining quarter has not been suitabled, because they are not good wells, ar hecause there is difficulty about money P-I presuma both.
- 81. Q. There has been a lot of money spent an these wells, and if they are left as there stand, they won't last; do you think it would be worth while to give email sums as grants-in-aid to put in this masoury and so make the well a permanent one?—Yes, I believe in good wells.
- 83. Q. Do you think the people would be roady to take the money as an ordinary taken loas P-Yes.
- 83. Q. What is the difficulty ? Rs. 860 has been received and spent; they still require another Re. 100; would that be refused P—Yes, I know one man's application that has been refused by the Mamlatder several times, I think also there is another reason: there has been a limited amount of taken of recent years, and when new applications como in, they are given precedence.
- Bt. Q. Surely it is better to give Rs. 100 to provent Rs. 300 going to waste than giving a loon for a new well ?—I think so: I know a village in which there are three wells, which it wauld cost very little to complete; until they are completed, they are useless.
- 85. Q. Do you think the people would be ready to borrow the money?—Yes, on all wells requiring Rs. 200.
  - 86. Q. Have they asked for it ?-I am not quite sare.
- 87. Q. Are you herd up for money for takeri, Mr. Brendon?—(Mr. Brendon.) No.
- (Witness.) There is difficulty with the kulkarni; bo demands money for himself, and would block the way. I think that is the real hindrance.
- 88. Q. You propose to give out money by small instalments as work goes on P—Yes.
- 89. Q. Yau say that come of the first instalment would stick on the way ?— Yes, it always does.
- 90. Q. Would some of each instalment stick ?-It would depend on how it was done.
- Ol. Q. Would that not be a considerable difficulty?—It seems to me that Mr. Breudan's recommendation of a Mom-laddar going round and distributing money would be a capital one; it is the subordinates that keep the money.
- 92. Q. We have been told that the worry and delay af going to head quertere would be an obstacle; still da you think the meney would be given in small instalments?—I think it would be a balancing af advantages and disadvantages; this would be a disadvantage, but my plan would be abuse of the meney by the farmers. prevent the abuse of the money by the farmers.
- 03. Q. When did your wells begin to dry un?—Thoy have failed very appreciably within the last 12 months; thoy began to fall in 1900.
- 94. Q. Mave you had a year of good rainfall since 1900 P-No.
  - 95. Q. What is your average ?-25 inches.
- 90. Q. Havo you erer knawn wells so close together that they exhausted the subsoil water in ordinary yours?-
- 97. Q. Supposing you had money to make welle in a suitable tract, what would you as the nearest they should be to one another, so as not to interfere with one another? -I have no deta ta enable me to say.
- BS. Q. You cay, "There are analytic wells that I know of that are said to water 20 or 25 acres, but a great part of this land is in justified and wheat." Does it not pay the owner of a well to irrigate larger arese in that way than

Revd. H. Fairbank.

smaller quantities of engarcane?—That regulates itself; you will find very little engarcane naw; all the water gres to juari.

- 99. Q. It is ovident that it is n greater protection against famine; if we could get welle used in that way to irrigate large areas of juars and whent instead of small areas of sugarcane, that would be an advantage?—Yes.
- 100. Q. What do you think will happen, will they click to that or return to the smaller produce outgreams?—I think they will go back; sugarcane is a very profitable crop.
- 101. Q Aliwhat rate can an ordinary man berrow money to make a well?—The rates are exerbitunt; it dopends un the occurity.
  - 102. Q. A fairly solvent man, I mean ?-24 per cont.
- 103. Q. Do you think that the 5 per cent, that Government charges over prevente a man from making n well, who would make it if he could get it for less?—No.
- 104. Q. Why do you propose to reduce the rates?—In this way; that Government gets great benefit from that well in the value of the produce raised.
- 105 Q. Government, you think, could afford to be generous?-Yes.
- 108. Q. Still that would not increase the number of wells P-No.
- 107. Q. Would you extend the period of repayment of leans in ordinary years? Is the period too chart?—I have not looked into that, but I dun't think the period of 10 years is too short.
- 108 Q. Do you think they will begin to recover the ndvances too soon!—Since the heavy takevi loans have been given, there has been stead, famine, and things have been very hard; I would like to see a few good years before I could say yes or no to that.
- 10? Q. You said there was a case you know us a man who had made two wells and was now degging a third. Would it not have been possible in this case to have helped him with buring apparatus, to have made a trial boring in order to see what stratum cases of below and what were the possibilities of water?—There are many wells in seeks, and there are streams that you might just miss. I have never som it tried.
  - 110 Q. Po you think it might be usefulf-Yes.
- 111. Q. Did the man you spoke of come to any water in the first two wells f-Nothing worth while.
- 112. Q. And us regulds the third well?-He drives his sect till 10 o'clock.
  - 113. Q. How far Is it from the others ?-A mile.
- 114 Q. (Mr Muir-Maclenzie.) How much did these diggings cost him?—About Rs. 700 each.

- 115. Q. (Mr. Rajaratna Mudaliyar.) Is there any impression among the people that there will be on enhancement of assessment if they sink wells?—I have never heard if it.
- 110. Q. You were permitted to construct a private bandhara at your usen expense?—My uncle, Dr. Ballantino, did thut.
- 117. Q. On what terms?—He did not usk for permission; it is on his own lands.
- 118. Q. There has been no enhancement of assessment?—Not yet.
- [Mr. Muir-Mackonzle remarked that, if it was on his uwn land, there would be no enhancement.]
- 119. Q. The whole of that is his own land?—The extenment is his own, a part of it of the top might not be; it is like u that on the side of a hill; it is not n stream; this year the bindhara has not filled up, and there is no flow from it, but there is an old well underneath it which has filled and which was not full before.
- 120. Q. (Mr. Muir-Mackenzie.) Would you ndvocate the multiplication of that throughout the country?—The country is not steep enough for that.
  - 121. Q. Terrneing is a good thing?-Excellent.
- 122. Q. As a protective measure in time of drought?—It does not seeme very much with us.
- 123. Q. Would you be disposed to apply to Government to give you taker to distribute in your mission?—The difficulty would be the collection.
- 124. Q The Revenue Establishment might collect it?— We would rather the Revenue officers looked after it.
- 125. Q Why?-Because I should distrust my judgment. I should be nfraid of being a little too soft-hearted.
- 120 Q. If you lind the responsibility?—That is true, but there is the danger I mention because we have personal dealings with the people.
- 127. Q. I don't mean you should advance it to all the people, but only to your own?—The trouble would be that it would overwhelm us with work; we evild not nudertake it; my father tried the work of consiliation, and found it too much.
- 128. Q. Do you think it would be a good thing for Government to construct wells in the rayate' lacds?—I don't see why it should not if Government can get a trust-worthy staff to do it.
- 129. Q The rayate would not object, would they f-I doo't think so.
- 130 Q. Would it be more costly, do you think !-- I pre-ume it would cost more.
- 131. Q. How much more?—It would cost at least 10 per cent more; still I don't know why it should cost so much, because it would be given by contract; the only leveble would be that there would be a sticking on the way with the underlings; the supervision would be expensive.

Wirness No. 64.-Mn. L. M. Bose, Executive Engineer, Ahmelneger District.

Answers to printed questions.

Mr. L. M. Bosc. 19 Dec. 01.

I,

Paragraph II.

District.

Gross
Gross area under
command of
Government
Free.

Gross area under
command of
Government
Irrigation works.

Ahmeduagar . 4,214,478 acres . C9,780 acres. Khandesh . . . . . . . . . . . . 57,414 acres.

The actual area irrigated by Government works has

seres 9,400 in Ahmedingar District (1903-1901), acres 9,741 in Khandesh District (1826-97), both years of draught. Cause—rancily of water. In addition to the above, there are 163 uid second class landbares in Ahmednagar supposed to irrigate 5,100 acres of culturoble land in the talukm of Akola, Shrigonda, Nagar Parner, Karjat, and Kapargaon. With the exception of two, they are all temporary earthen bunds from each every sear) across small early-dry streams, and sinted 1877 the irrigation under them has been almost nil, owing to the streams belong dry. In Khandesh the bandbaras are mostly of massary across the large tributation of the Tupli; the area irrigated from them is 22,150 acros. The works are important, and are repaired and isoproved by Government from time to time. Latterly there has been scarcity of water-supply, and the arca has decreased. In Khandesh there is a large number of small village tanks that used to irrigate o few across of land under them, and were also used for watering cattle, etc., but most of them have either silted up or fallen into disrepair. In Nagar there are very few such tanks. Of well irrigation 1

oan only quote the following figures for a few telukas in Khandesh District:—

		,			Pakka wells.	Kaoheha walls.	Aren irrigated.	
Dhulin Molegaon Taioda Shahada Sinkhada Amalner Sayda Chalisgaon	• • • • • •	•			1,275 1,076 30 233 978 1,405 2,700 1,182	59 - 290 10 80 115 	8,008 2,364 83 409 2,056 6,176 2,485 1,905	

# Well irrigation in Nagar district is computatively small.

Well irrigation in Nagar district is computatively small.

Character of the soil.—The chief soils for oultivation are: Black (Kali), Tambat (Red), Barad and Paudheri (White), and in parts of Khardosh Bharki (white and salty). The sub-divisions are numerous and vary in different parts. Black soil is of two kinds, one known as black "cotton soil," a deep moisture-holding rich soil which yields a good crop of cotton, wheat and grain in average years of rainfall. Most of the eastern portions of Khandosh abound in cotton soil. The other is of a sticky and clayey nature, does not hold so much wnter, and is not so favoumble for rabi crops without artificial watering. Pandhari and Tambat, although naturally poor and yielding coarser grain, such as bajri, juari and till, will, with plonty of manure and water, bear heavy regetable and sugarcane crops. Bhurki soil with plenty of rainfall will yield good cotton orops. In a resting private private private and Mosam Valleys, the agriculture has been greatly dependent on bandhara irrigation from pre-Eritish period, and rice and sugarcane are extensively grown. Ordinarily, i.e., if the rainfall is average and timely water is not asked for monsoon dry-crops, such as bajri, till and juari (coarser kind), during the southwest monsoon. Orly fruit-trees and rich irrigated crops such as sugarcane, kamed (superior rice), plantain, pan, venetables, etc., that require artificial watering during the west monsoon. Only finit-trees and rich irrigated crops such as argareane, kamed (superfor rice), plantain, pan, regetables, etc., that require artificial watering during the monsoon as the rain in the Decean is not continuous, except on the Byhadri range. When there is a long break (usually in Angust or September), people become anxions, and then ask for water for monsoon dry crops. Sometimes the rain is heavy in the beginning, and the sowings are late, and these require artificial watering for bringing the crops to naturity. The following table gives the crops grown and the waterings required:—

TABLE I.

Name o Crop.		Nainro (classifica tion).		Number of Waterings required.	Time of year.	Remarks.
Sugarcao	c	Percuulal	•	Evary 8 or 10 days.	All the year raued.	linzimum rota- ilon 15 daya in years ni good ratotoli,
Pan (bet Plantain		<b>"</b>	•	Every week .		In cold weather if there is good dew less water ro quire digrown in Nagar Dis-
Gurya . Lemon	•	} "	•	Fificen days.	,, .	Chiefly grown in Eastern and Central Khan- dish.
Kamo (rice).		п	•	Ten doys .	, i	Chiefly grown in Work Khun- desh and Un- per Ciroz and Minsam Val- leys.
Groundo	ut.	Eight mo	nth:	Every 15 days	Sown in July or August Waterlug re quired only tor first 4 of 6 months.	
Bliang			•	",		Nagor capeol-
Chilles	,	> н	٠			
Outoos			,	,, ,	, n •	

TABLE I-contd.

Mr. L. M. Boss

91 Dec. 01.

· Namo ni Crop.		Nainre (classifica- tion.	Number of Walerings required.	Time of year.	Remiers.
Cerlio	•	Eight months crops.	Every 15 days	Sown in July nr August. Water in g rn qui red only far first 4 or 5 mooths.	Nagor special-
Brinjals		. ,,	,, .	,,	
Wheat	٠	1			
Gram Ineri	•	Rapt .	Four water- lngs, Two in very good sears.		
Carrois	٠				
Mairo Bájri Mag .			Occ or two waterings according	Sown in July or August, traped in	triot.)
Watal Bala. Cotion		Mnn acon dry.		aulamn.	Khandesh.

Distribution is controlled by the canal establishment on first class work. For every ten miles of canal and distributary (e.g., Jamda Canals in Khandosh) there is a Canal Inspector or Karkun, and nader him, 1 Patkari nud 1 Chaukidar for every four miles of main canal. The last wentioned watches the canal and maintains it and opens the sluices, and the Patkari distributes the water from tail to head of distributers le appropriately. the sluces, and the Patkuri distributes the water from tail to head of distributery in proper rotation. One measurer can measure about 1,000 acres. The revenue for all first class works is derived from direct crop rates. In second class works the area under the "channel" is permanently assessed as Bagayot, which includes water share and land assessment and are collected by the Revenue Department. In Khandesh these lands are called "Thals" sub-divided into "Phads" for practising rotation of crops (usually triennial and in a few cases quadrennial and quinquennial). They are all controlled and very occurrently managed by the irrigators of a village as a body, who have ancient and hereditary rights in the administration too lengthy to montion here.

# Paragraph III.

I believe no tank has been constructed in the Bombay Providency, with a high earthen dam cored with masonry walt. Black soil absorbs more water than others at first, wall. Black soil absorbs more water than others at first, but when once thereagily soaked, it is fairly water-tight. I have personal experience of only two irrigation works in black collon soil country, riz., the Jamda Canals and Mhaswa Tank in East Khandesh. The people grow chiefly cotton, which is very paying, with little trouble, and does not require any artitional watering in yours of average rainfall. Only in years of prolonged drought they use canal water (late in the scisson as a role) to bring the mossom crops to maturity. The annexed Tables II and III will show how the irrigation fluctuates in good and had years and also the protective value of the works and how the canal water is keenly resorted to in years of drought, such as 1900-1901. There is very little poreunial irrigathe canni water is keenly reserted to an years of drought, such as 1900-1901. There is very little perennial irrigation under these works, partly because the people are not very rich, and they do not like to risk capital for high class irrigation, but prefer growing oction. But latterly, I think, they have come to know the value of irrigation works and are keen about it, and they are likely to go in more in future for irrigated crops if water is could be. In paracettan growing parts, however, such as to go in more in future for irrigated crops if water is available. In non-cetten growing parts, however, such as Pimpalner Taluke, Upper Girms and Mosam Valleys, where the people have been practising high class irrigation from time immemorial from ancertain bandlaras, the owners of black soil lands are very anxlous for storage tanks, and these works are very desirable and are likely to be more remunerative than in cotton-growing tracts such as East Khandesh. Ahmednegar is not a cotton-growing district and here high class irrigation is likely to downsh and is desirable. Although perennlal irrigation under the existing works is very limited, but that is chiefly for want of sufficient water-supply. The people are very desirans of storage works and in binck soil high class irrigation is likely to flourish. likely to flourish.

Mr. L. M. Bose. 19 Dec. 01.

# TABLE II.

Jamela Canals.

Nature of	Years.				`,	Raintall		ORDINART KHARIF AFD RABI CROPS.			Total lrilga-	Total	
Rainfall.						Kharif.	Rabi.	Total.	Kharif.	Rabi.	Total.	tion.	Rovenue.
Good	1892-93 1878-79 1875-76 1886-87 1883-81 1887-88	•		•		42:91 88:37 87:06 28:14 30:02 23:48	1·16 0·87 0·98 8·25 6·30 6·78	44.07 89.24 88.04 86.39 86.83 82.21	841 22 66 69 231 142	1,500 760 248 1,009 1,622 910	2,141 772 301 1,007 1,673 1,162	2,271 814 854 1,369 2,088 1,336	4,177 5,872 1,826 9,668 4,544 3,267
Moderate.	1806-07 1898-09 1879-80 1894-95 1890-91 1891-95 1895-96 1897-98 1891-192 1876-77 1892-98 1893-94 1893-94					27-29 25-56 25-56 25-57 22-15-70 22-15-70 21-50 21-50 21-50 21-50 21-50 21-50 21-50 21-50 21-50 21-50 21-50 21-50 21-50 21-50	011355 011375 0113775 0001137 00000 00000 00000 00000	27-60 26-97 26-60 25-94 21-78 21-71 24-91 23-81 22-35 20-31 10-52 10-52	1,400 67 181 411 231 71 249 145 210 61 881 70 119	3,257 2,233 811 1,250 578 705 1,920 2,071 718 1,001 1,001 878	4,687 2,300 945 1,680 1,230 958 1,505 2,281 1,472 1,472 1,472 1,472	4,080 2,673 1,073 2,093 1,313 1,148 1,472 1,661 3,013 1,536 1,140 1,5-5	11,081 7,050 5,251 5,019 8,205 7,748 8,212 10,046 2,932 5,321 4,425 6,630 4,832
Bul.	1889-90 1880-81 1886-89 19 0-1901 1877-78 1893-1900	•	:	:	•	17:80 18:61 14:40 16:80 14:15 8:15	1:04 5:41 2:29 0:00 1:82 0:00	18:51 17:02 16:62 16:50 16:27 2:48	620 1,848 1,828 1,123 1,010 2,023	1,254 1,203 2,867 2,465 2,923 1,518	1,774 8,045 4,723 3,658 4,842 4,171	2,023 8,224 6,174 8,767 4,025 4,616	4,074 9,565 7,455 7,264 11,631 2,140

# TABLE III.

# Mhanco Tank.

		Enzi	all ix	C#19.	311	ia mei Cicatr Idral	. est	3 2 2 3	Liera	Ë
		Rhaeif.	RAM.	Teta!	Ktard	liatt f	Total.	77		EKRES.
G:43:nrs	•					41		1		
1-75-70		43 63	3 25	10 00		245	41	42	69	
1591-51		31 25	13 76	12 (4)	21	**3	314	34-	1,61	
1593-97		2152	721	52 10	1		277	311	E F	
Berst			-			$\overline{}$		<u> </u>		
1400 1600	•	0 <b>0</b> -9	000	0.04	273	£23	101	7:3	1,412	
Esl geort.	,				1					İ
1=31-32		11 47	2121	30 65		0	40	123	70.	
15-52		16 10	211	17.26	c1	425	520	£70	· (-:	
	_		1	1	<u> </u>	<u> </u>	1	1	1	

Paragraph IV.

The existing irrigation works in Nagnr District are:-

- 1. Bhatedi Tank and Canal.
- 2. Ojbar Left Bank Canal.
- 3. Likh Canal.

No. I is a storage tank of a capacity of 160 million cable feet (much silted up lately). It generally fills as a rule, and only four times since its construction the replenishment was short by about 20 per cent. The Irrigation has varied from 750 acres to a maximum of 1,720 acres during the last twenty years. On the whole the work has been fairly successful and the silt clearance is the only representation of 1,720 acres during the last twenty years. improvement de-trable.

Mos. 2 and 3 are fed by the natural perennial discharge of the Prayara River. The irrigation under the Ojhar Cauni has varied from 1,100 acres to 7,380 and that on the Lakh from 160 acres to 1,674 acres during the last ten years. The river supply is never equal to the demand, and in the case of the Lakh Canal especially, in bud years it runs dry about the end of February. The Ojhar is a

little beller off, but the supply being nucertain, high class irrigation does not prosper, the perenuial area varying from 145 to 265 acres. The people on this meanut do not venture to go in largely for high class irrigation under either works and they only take water, when available, for light crops such "rahi" and "monecon dry," but chiefy depend on the rainfall.

Particular recarding completed and proposed works as

Particulars regardle g completed and proposed works as per necessardum of Inspector-General of Irrigation are with the Supermeeding Engineer on special duty.

Resides the above existing works, storage necessis and canals have been proposed on the Mul's and Seens, the former when fully extended is likely to pintest about 3000 square miles of culturable land. There is also the Bolareri River project for irrigating Ropargaen and north of Sevara talakas. The details are with the Executive Logineer, Nack district. The above practically deals with all the important streams in Nayar district.

with all the important streams in Nagar district.

In Khandesh there has very large scope for extension of brigation. It is possible and is very designable to constituct a storage tank in such and every one of the great tributaries and sub-tributaries of the Tapti especially these under which handham irrigation is practised in a large scale, e.g., Penjiter, Kan, Atusum, Girna, Buri, Burni, etc. Latterly a great many of these have been prospected and proposals made for storage tanks and counis, the detailed information of which has been collected by the staff of the Sup-rintending Engineer on special duty and it is unnecessary for me to mention them here.

Paragraph V.

All irrigation works in Nagar district (and also in Khandeel) are "Imperial." I think it would be desirable that the Provincial Government should undertake the responsibility of the "Protective works," as it will give them a free scope to deal with such questions, and a neh works will be a great been to the province as recent experience has provincial Contracts," and um therefore unable to as more on this pant. to say more on this print.

Paragraph TIII.

I do not know of any tract in Nagar and Khandesh districts where the land or comps have been injured by excess of water and unter-logging. This is practically impossible, as the water-supply is by no means excessive and the people have to be given water by rotation as a rule. rule.

# PARAGRAPH IX.

# TABLE IV.

List of Famine Works executed during 1901-02 in Ahmednagar District.

No .	Classification.	Names of Works.	Expendituro during 1901-02 io end of September 1901.	Total Expenditure to end of Septomber (i.e., including last year's Expouditure).	Renabus.
	,	Provincial.	Rs.	Rs.	
1	Roads	Improvements to the Ahmednagar Paithan	5,992	5,992	
3	Do	road. Improvements to the Ahmednagar-Malegaon road, Section I, from Rahori to Kolbar, f.e.,	14,360	40,820	
3	Do	miles 26 to 34. Improvements to the Ahmednagar-Malegaen road (from the Seena river up to 3 miles worth	62,019	62,019	
4	Do	of Rahuri), Section I, from miles 5 to 26. Improvements to the Ahmednagar-Malegaon road, Section II.	7,195	7,135	
		Incorporated Local.			
5	Do	Improvements to the Rahuri Station feeder	654	854	
G	Do.	Constructing Kharda-Jategaon road	113	1,89,465	
8	Do.	Constructing Kop argaon-Pantamba road	2,43,603 49,553	2,48,603 40,653	
9 10	Do.	Improvements to Sheognan-Bodhegaon road . Constructing Jamkhed-Khards road	8,807	8,807 20,164	
ű	Do.	Constructing Mahi-Jalgaon road to Shoinpur Frontier.	7,403	1,64,543	
12	Do	Constructing 1st Section of the Visapur feeder	1,147	1,63,151	
13	Do		20,889	29,989	
11	Do. , .	Supa-Parner read. Constructing Pathardi-Moho read, Section I, from Pathardi to Chinchpur Zula.	29,212	1,80,058	
15	Do	Constructing Jamkhed-Karmala road up to Sholapar Frontier.	61,391	1,10,124	
16	Do	Extension of the Newses-Sheagaon-Bodhegaon road up to Moglia Frontier near Sukli.	2,311	98,385	
.					
1	Metalling .	Provincial. Collecting and breaking metal on the Ahmedangar-Poons road section from Ahmedangar to Ghod river.	**	1,13,153	
2	Do	Collecting and breaking motal on the Ahmed- nagar-Patthan road.	56	2,77,653	Completed.
3	Do	Collecting and breaking motal on the Ahmed- usgar-Malegaou road, Section II.	2,164	5,49,031	Completed.
4	Do	ments to the Kolhar Bari road from miles 61	1,17,373	1,98,394	
5	Do.	to 66. Collecting and breaking metal on the Kopar- gaon-Singanapur road.	1,291	20,233	Completed.
6	Ďo	Collecting and breaking motal on the Ahmed- nagar-Shengaon road.	8	2,33,398	Do.
7	Do	Collecting metal on the Newson Belapur road	147	2,51,217	Do.
8	Do.	Collecting motal on the Shondi-Vambori road Collecting metal on the Rahata-Chitali road	61 15	39,911 1,02,658	$\mathfrak{D}_0$ .
io	Do.	Collecting metal on the Nowara-Sheognou-Bod- hegaon road.		4,22,880	Do. Do.
11 12	Do	Collecting metal on Khospuri-Ismalpur road. Collecting metal on the Nagur-Ahua Chat road.	63	98,182 30,171	Do.
1	Irrigation works	water-supply to the town of Ahmednagar.	87,828	5,27,574	Do.
2	Do	Imperial Irrigation. Silt elearance, Laklı Canal	0,408	56,097	D <sub>a</sub>
3	Ď <sub>0</sub> .	Silt olearance, Ojhar Left Bank Canal at Nala No. 28 in mile 16.	26	60,117	Do. Do.
4	Do. , .	Constructing Ojhar Right Bank (including Musselwadi tank).	2,52,581	10,50,069	
5	$\left\{ \begin{smallmatrix} D_0, & \cdot & \cdot \\ D_0, & \cdot & \cdot \end{smallmatrix} \right.$	Constructing Visapur Tank	2,20,359 7,187	8,18,373 7,187	

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The following Irrigation works in Nagar District were left uncompleted, and it is very desirable that they should be speedily finished as "Protective works Imperial":—

1. Visapur Tank (still in progress);
2. Maladevi Tank (work earlod out by Executive Eogineer, Nasik district);
3. Ojhar Right Bank Canal; and
4. Musslandi Tank (in progress).

No. 2 will introduce irrigation in Shrlgonda Taluka, which always suffers from drought. In the beginning, the work will probably only jost pay its warking expenses but later on irrigation is expected to develop and the work may pay as much as 2 per coat, on direct capital, but he indirect profit will be very great, as it will protect about 50 square miles of Shrigooda taluka from famine in had rears.

about 50 square miles of Shrigooda inluka from famine in bad years.

Aos. 2 to A.—In conjunction with the existing Iakh and Ojhar Left Bank Canal from the Pravara River Irrigation schome. Tho existing two works being dependent only on the river discharge, invariably run short of water and consequently high class irrigation canaot prosper as already described in paragraph 4. The storage tank will be a great stimolos to the existing irrigation which will develop rapidly and moreover fresh areas will be brought under the new works. It is anticipated that about 200 square unless of the Pravara valley will be protected from famine and the works will be a great boon to the people and is likely to bring in some profit to Government after paying working expenses.

There have been no village tanks or other Irrigation works completed during the recent famine in Negar district.

district.

# Paragraph XIII.

Scale of water rates in Nagar District are :-

7/24
8 to 12
4
2 to 3
0.8.0 to 1.0.0
4

In Khandesh the rate	es are	:-			Rs.
Perenuial from			•	. 10	) to 16
Eight months	٠,	•	•	. 4	to 8
Four ,	·	•		. :	2 to 5
Monsoon dry					1 to 2
Special hot weat	ber				4 to 8

In all first class works water applications are received once n year for perenulal and by season for the other The distribution is controlled by the Cacai Establishmoat as described in paragraph 2.

Lines 4 and 5 answered in paragraph 5.

The attached Table VI gives the balance of tank water at the ead of irrigation season (31st March) for the Bhatodi Tank in Ahmednagar district from 1897-1901 and for n few typical years for three tanks in Khandesh district. In ordinary years, if the tank fills, there is generally a balance at the end of the year. The only other sources of rerenne besides water rates consist of realization from sales of babul wood, thoms, hemp plant, grass, and also rent from leasing dry portions of tank bed, but these constitute small proportion of the revenue. The charges of maintenance and establishment in irrigation works in the Decem are certainly not fair. They are often out of all proportion to the revenue realised, e.g., Lakh Canal in Nagur district. The revenus in the year 1897-98 was Rs. 1,400 and the Establishment charges were 29,055 and area irrigated 950 acres. The revenue accomits of these works are therefore by no means indicative of the netual financial results of the work. They are practically celipsed by the exceevively heavy Civil Felablishment charges, as the areas irrigated are comparatively small. TABLE VI.

Balance in Tank at the end of Irrigating Season. (In million cubic feet.)

				KO ÇALON	EVIDER					
	REMARES.		Full capacity, 150 million	oubic feet.	•	Full capacity.	cubic feet.	Full capacity, 342.		Fall. capacity, 119.
	1900-1901.	:-	:			I zwz	-	20-	(1900-1901)	I 15AZ
	1898-55. 1899-1800. 1900-1901.		:			:		170-19		:
	1898-99.		6.63			:		193-58		:
	1897-98.		4.16			:	Å.	01.751	(1897-98)	2iAZ
20 000	1826-97.		:			65•18		•		:
12 000	1890-96.		29.89			13.53		:	(1885-96)	41.87
200	188-1-80·		7-16			:		:	(1894-95)	13.60
2000	10.5301		3473			69.10		:		:
00	1002-03.		63-53			i		:	(1892-93)	14.80
00.1001	rent-na.		F9.0			:	(1869-90)	48.75	(1891-92)	17.95
1800.01	10:00		46.56			:	(1888-89)	245.21		: .
1800.00	1001		65-19			21.67	(1884-85)	08.82		:
1888.60	1000000		39.33			:	(1882-83) (1883-81)	170-11		:
1007,00	1301-33.		116-26		(1882-83)	Ni.	(1882-83)	46-95		. :
,		ęţ.	•			•		•		•
		Nagar District.	Bhatodi Tank	Khandesh.		Mbarra Tank		Makti Tank		Persul Tank .

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Paragraph XIV.

The protective value of irrigation works in the Deccan has been immense since the year 1807. From the following table of works in Nagar district and the Jamda Canals (a typical work in Khandesh) will show that the canal water was fully utilized for irrigating crops:—

	Ojhar Canal.	Lakh Canal.	Bhatodi Tank.	Jamda Canal (Khandesh).
1896-97 1897-98 1898-99 1899-1800 1900-1901	Acres. 4,890 6,068 5,472 3,701 7,980	Acres. 1,614 950 970 1,058 982	Acres. 1,386 1,400 713 670 1,300	Aeres. 4,980 3,016 2,586 4,545

During the famines of 1696-97 and 1899-1900, the works of flood embankment and silt clearance were opened as relief works on the Jamda Canals in Khandesh, but the workers chiefly came from the neighbouring villages and only a handful of the labouring classes came from the irrigation villages and none of the agricultural class came from the latter places. The Kambis of these protected villages managed to raise a crop anyhow and had enough to live on, whereas the neighbouring villages were starving. Similarly on the Bhatedi silt clearance work in Nagar district in 1898, the irrigation villages sent only about 10 per cent. of the population compared to a neighbouring " dry " villago which sent 25 per cent. of its population to the relief work.

# . ]].

# A .- GENERAL.

- 1. Ahmedaagar and Khandesh Districts. I was in Khandesh for about 5 years at first a Assistant Engineer and latterly as Executive Engineer for Irrigation. In Nagar I have been for the last four months. I was also under the Superintending Engineer on special duty for two months.
  - 2. List of rainfall :-

List of average vainfall month by month on Irrigation Works in Almednagar District.

Mor	ithe.	Bhatodi (Ehatodi Tank). Averago of 21 years,	Ashni (Ojhir Canal). Average of 21 years.	Malunja (Irikh Cansll, Average of Bl years.
January February Alarch April Alny Juno July August September October November December	•	0 0 17 0 12 0 18 0 40 0 50 3 54 3 54 5 57 6 57 2 70 0 70 2 70 2	0-14 0-50 0-07 0-19 0-19 1-78 2-51 2-51 6-58 8-19 0-10	0-42 0 12 0 0 0 0 13 0 01 4 05 8 10 8 18 6 72 2 01 0 50 0 32

- 3. (1) There is no obstacle to extension of irrigation in either district, for "sparsity of population."
- (2) In irreated areas, the supply of eatile is generally sofficient, but during the recent famines the mortality of eatile has been heavy and is therefore likely to affect for some time the new tracts where irrigation projects are proreed.
- (3) The supply of mannro was noticed to be insufficient under the James Canals in East Khandish. In Negar district, the irrigation villages have sufficient manure.
- (4) No unsuitable soil in Nagar district. In East Khardesh the soil is mostly black collon, the result leing that the irrigation does not floarish so well under the Jamda Canals and Mhaswa Tank.
- (6) Uncertainty of supply of water and its too early constition have been the chief obstacles for extension of irrigation in both the districts.
- (6) Under the Jamda Canals and the Ojhar Left Pank Canal, lack of capital has been to a certain extent the cause of non-development of high class irrigation.
- 6. I know of no instance where cultivation in Jirayat land has been deserted for irrigation tracts. I have noticed the people everywhere very anxious to have water-upply increased and ensured in order that they extend irrigation. I have noticed this particularly in Pimpaluer taluka and Girca and Mosain valleys, where the agriculture is chiefly dependent on old irrigation channels and bandharas.

# B .- CANALS OF CONTINUOUS PLOW.

- 7. (1) Two crops and sometimes three rrops are grown in one year if there is sufficient water and manure
- (2) Yes. More unlumble crops are grown if the people are keen and have enough capital and manuro and water.
- (S) (a) and (b) Yes. (c) If the water supply is ample.
- (3) (a) and (b) Yes. (c) If the water supply is ample.

  O In all first class counts in the two districts, weter rates are charged on the actual area irrivated, and the owner of the land is the person who is responsible for the payment of assement to Government. In Khandesh nuder the second class works a consolidated rate is settled by the Revenue Survey Department which includes the lands assessment as well as the water rate for the whole area under command of the channel known as the "Tual," irrespective of the area netually irrighted. In Nagar there are no account class channels of continuous flow.

  The area was classed on the Other and Lach Canals.

The average erop tate on the Ojhar and Lakh Canals (Magar District) is Rt. 3-12 Oper nere.

In Khandesh on the Janda Canals the average rate is Rs. 5-6 5 per acro. All thee first class works.

The "Thel" rate for second class works vary from Rs. 2 to Rs. 15 in Khandesh. to Re 15 in Rhandesh.

- 10. It generally easts the irrigators about Rs. 2 to Rs. 5 for making channels from the "distributary" or "canal" for bringing water into his field. This is generally borne by the owner of the land.
- 11. The evils mentioned in the three lines do not exist on any of the works that I have come across. Rotation system is generally adopted, which prevents waste of water and water-logging.
- 20. In first class works the maintenance charges including small repairs, slit charance, the, are rarried out by Government and the rharges vary from Rs. 2 to Rs 3 per acre. In second class works the villagers generally do it, nullest owing to chromostances beyind their control such as exceptional finels, etc., the work is two costly or difficult for them to carry out and in such rases Government carry out the work from "Imperial Fands." This system is not very satisfactory. In several justimes villagers have neglected the channels and let sitt accumulate and then they apply to Government for doing this work as being "legond their power to do." I think same legislation is necessary, to define the responsibilities of the villagers on recond rhase works. Certain rules have recently been framed by the Commissioner, Central Division, but they have never been observed. Legislation is necessary. 20. In first class works the maintenance charges includ-

# D .- Tines.

- 23. (1) All the tanks in Nagar and Khandesh districts are supplied by the annual rainfull on their catchments.
- (2) By n direct renal from the tank in the case of Bintodi (Negar) and Mhaswa (Kindesh). The Mukty and Parenl tanks in Khandesh feel old second clars band laras from which water is delivered to the lands by ' channels
  - (3) The supply is maintained in all the above cases-
    - (a) Throughout the year.
    - (b) About 9 months.
    - (c) Up to December or January.

Rose.

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- 24. (1) Too late replenishment generally affects sowing of mensoon and eight months crops; the balance that is neually left from provious year is generally utilized economically for percential crops, and cannot be epared for other
- (2) Too early cessation affects the porennial oreps especially and unless well water is used they are liable to perish. As a rale, however, all fields with perennial crops have got wells.
- 26. Not in ordinory years. Esoh perennial field as a rulo has a well (in Nagar no application is granted for perennial, unless there is a well in the field). In bad years well water has to supplement the sanal water, especially for high class crops, and only half the usual rate is charged in such cases.
- 28. Bhatodi Tank (Nagar) avorago rato Rs. 4-12-9 por acre actually irrigated.
- In Khandesh average of four tanks is Rs. 5-5-9 per acre per area actually irrigated.

Under Mukit tank in Khandesh (Lower Panira River works) a double system provails. The "Thal" areas under the command of the second class channels that existed before the construction of the tank are still charged con-solidated "Thal rate" irrespective of area irrigated (rate averaging from Rs. 10 to Rs. 13). The fresh lands besides the above that received tonk water are charged first closs crop rates.

- . 29. Samo as paragraph 10.
- 30. By Government, except on the Lower Panjra worke, whore the villagers look after the channels. Same remark as in Question 20. Legislation is especially desirable for such works as recently (in 1899). There was a good deal of trouble about the distribution of water between Thol and "Jirayet lands,"
- 33. The Bhatodi Tank slomgo hos been considerably 33. The Bhatodi Tank slorage has been considerably reduced (by obent 50 per cent.) since its construction (30 years ago), owing to accommulation of silt. The quantity of ellt accumulated in these years is about 73.4 million cubic feet, i.e., at the rate of 3.44 million cubic feet per year, from a catchment of 44 square miles. No dredging has been reserted to. The work of removing silt by excaration was done as a relief work in the year 1898-99 in the hot weather, when the tank was empty.

# E.-WELLS.

- 34. (1) The depth of permanent wello varies from 20 to as much as 60 feet. The water surface varies from 13
- 1. Q. (The President)-The district you know best is Khandesh !-- Yes.
- 2. Q. You were there for 5 years?—About that; I was there from 1896. Before 1896, I was at Ahmedingar for 3 years os Assistant Engineer.
- 3. Q. You say there is no soil in the Ahmednagar district nashitable for irrigation. Do the people irrigate all kinds of soil?—I think so; especially in Ahmednogar. The black soil there is not of the same kind as in the East Khaudesh which is deep black cotton soil. In the Ahmed-nagar district the black soil is not so deep, has more clay in it and is suitable for the irrigation of high class crops.
- 4. Q. Have you known cases of irrigation of rabi crops in Khandesh ?-Yee; I have seen wheat and gram irrigated under the Jamda canals.
- 5. Q. How long does the canal keep running?-In Fobruary the canal was quite dry.
- 6. Q. Wheat is sown under this canal?—In 1899 they went in largely for bajri and cetton oreps.
- 7. Q. When is bajri matured ?—In September,
- 8. Q. Is that a kharif crop ?-Yes.
- 0. Q. When is the rabi crop sown ?-In December and January.
- 10. Q. The canals, which run full up to December, give 10. (2. The cannis, which run tull up to December, give quite sofficient water for the rabi crop?—Yes; as a rule. Yery large areas were irrigated in 1896. That was about the maximum under the Jamda cannis. 1896 was not a bad year, although there was distress; we had splendid rain in the beginning of the season. In the year 1899 the case was quite different. The rainfall was deficient,
- 11. Q. I notice that in 1809-1900, 4,615 neres were irrigated under the James canals?—Yes; that was a very entisfactory area compared with other years.

- to 30 feet from ground level, and depth of water from Mr. L. M. 5 to 13 feet.
- (2) Generolly from enb-soil percolation, especially those in irrigated trace and below tanks. In the hilly parts wells are generally fed by oprings.
- . . (a) They do not fail in ordinary years as a rule.
- (b) Generally fail; especially those fed by springs.
- (3) Pakka wells coat from Rs. 150 to Rs. 600; Koeliolia wells from Rs. 75 to Rs. 100.
- (5) Water is usually raised by "Mote" or leather bags drawn by one or two pairs of bullocks. The number of "Mots" vary from 1 to 4 according to the size of the well.
- (7) The average area irrigated by a well varies from 2 to 8 acres in one year.
  - 35. (1) Yes, partly.
- (2) Generally vegetables, chillico, enions, sweet-pointees, etc. Sugarcaue is raiely grown from wells.
  - (3) (a) Yes.
- (b) They generally grow food-grain and fodder in bad years. Sweet-polatoes were very lergely grown during the last famine in Khandesh as they afforded good nourishment to the famished.
- 38. In Nagar district recently some experiments were mode with boring apparatus with success. I think this should be encouraged, and it would be advisable for Government or local bodies to invest in a number of boring tools and let them out on hire to cultivalors, at reasonable rates, and also professional assistance should be given where readed where needed.
- 39. Government cannot very well undortake to construct wells in priente lands, but they might assist by giving professional advice and supervision free of charge and also by giving tagai advances and seeing that they are made praper use of.
- 40. Kachcha wells are commonly resorted to in years of drought but unless they are dug in places where water is expected to be met with, such as in tracts below some tank or canal, or near banks of attenues, they are invariably unsuccessful. In 1890, in Khandesh, these wells hold water only for short time, and as the season advanced 50 per cent. of them dried up.
- 12. Q. Was the canal dry in December ?- It was not quite dry, but it was not working at anything like its full copacity.
- 13. Q. You have a tank and two canals in your district. Have they their own catchment basins?—Yes.
- 14. Q. From local minfall?-The Bhatodi in Ahmednagar and the Mhaswa in Khandceh are fed from their own ontchments by streams m the ghats.
- 15. Q. What is the Multi P—It is a tank fed by its own catchment. It feeds a number of bandharas below.
  - 16. Q. No canal feeds it ?-No.
- 17. Q. Is it n tail tank !- We have no tail tank in Khandesh at present.
- 16. Q. Throughout Khandesh is there a great number of old village tanks?—There is a large number in the Nasik portion of the Irrigation charge.
  - 10. Q. None in Ahmeduagar P-Very fow.
- 20. Q. Are the tanks in Khandesh and Nasik generally in good order?—Most of them have just been repaired. During the fleeds of 1877 and 1896 a great number of the bunds burst. I know one bund particularly near Dhalia that burst in 1896.
- 21. Q. (Mr. Ibbetson)-In 1896 ?-Yos; in the last
- 22. Q. (The President)—Do the people show any desire to have these bunds repaired !—Yes.
- 23. Q. Do they never do that themselves !- No; the work is too heavy and too expensive for them.
- 24. Q. De the Public Works Department de anything ? -No; the Irrigation Department generally repair them.
- 25. Q. Havo yen been employed in ropairing any ?-Yos, I sent up estimates for the Bhokar Tauk which was going to

Mr. L. M. be takeo up as famine work, but sanction did not come in Bose. time, and it was not taken up.

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- 26. Q. Was the Parnaphra tank substituted for it?
- 27. Q. Is that u local tank?-No; it is u very big irrigation tank.
- 28. Q Aport from famino relief does the Poblic Works Department not repair these tanks from time to time?—Yes, the Public Works Department repair certain taoks, but the people have to make a 10 per cout. centribu-
- 29. Q. Thoy apply to the District Eogineer?—No; to the Irrigation Eogineer. A reference is made to the Revenue authorities as to whether it is worth while doing the repairs, whether there would be only appropriately increase of irrigation, and also whether the rayats are willing to pay assessment in case the tank is repaired. Generally a consolidated rate is charged. solidated rate is charged.
- SO. Q Are there any places where there are chains of tanks following each other down the same streom?—No; we have proposed one on the Panjra, but it has not been
- 31. Q. Are the people keen on irrigation in ordinary times and do they make applications for irrigation works, or do they only want irrigation is those of drought?—In East Khundesh they are not very keen.
- Khundesh they are not very keen.

  32. Q. In the east I suppose cotton grows easily without irrigation?—Yes, cotton grows very easily; it requires very fittle trenble end expense; and so they go in largely for cottoe. The case is quite different in Ceotral Khandesh and in the west along the upper valley of the Punjra. North of the Tapti the people like irrigation. A chaonet in the Shahada taloke was repulred during the year 1896-97, which irrigated, I think, something like 500 or 1,000 acres. Similar chaunels might be made north of the Tapti where the people don't grow so omeh cotton. They go in more for rabi, wheat and gram. I have also noticed that the streams corth of the Tapti, near the foot of the Satparas, are mostly perennial.

  33. Q. Is the rainfull along the right hank of the Tapti
- 33. Q. Is the rainfull along the right bank of the Tapli heavier throughout Khandesh generally ?—The Satputas get n very good rainfall.
- 34 Q. Do you think favourably of thom ?-I think Karrand is a very good tank; it will not be so expensive as the Amner tank, which is very costly. I doubt whether it will pay, as Governmeent will have to invest a large omount of capital lo it.
- 35. Q. Do yoo thick the lond below the Kaivand tack will take irrigotion?-Yes.
- 36. Q. Whot other tanks you have been engaged upon ?-Chankapur, Merkundi aed others.
- 37. Q. Which of these do you think the best?—The Chankapur tank is the best, because it will be a predactive work. People in the upper reaches of the Girna have been used to irrigation from time immemorial, but latterly owing to the destruction of forests the river sappty has become very poor-
- 39. Q. The catchment basin is 100 square miles?-Yes.
- 39. Q. (Mr. Muir-Mackenzie)—Hus the destruction of forests taken place recently ?—Not io my time; it was done 50 or 60 years ago. The villagers in the npper receives of the Girms used to practice irrigation from old channels, but now they have discountined doing so because the water anpply is not sufficient, which shows that the river supply was sufficient at one time, but it is not so now.
- 40. Q What time do you refer to?-About the last 30
- or 40 years
  41. Q. Do cultivators say that f-Yes.
- 42. Q. Do they attribute it to the destruction of the forests?—They say that they cannot tell what the real rause is; but that might be one of the reasons.
- 43. Q. (The President)—When you refer to the system of repsire of second class works, you mean bandharas?
- 44. Q. You eay "in several instances villagers have 41. Q. Ion eay "in several instances valugers have reglected the choncels and lot silt accumulate and thea they apply to Government for deing this work as being beyond their power to do." What are these chonnels? Whot would you like to do?—I was referring specially to the Mukti tank, where I had trouble in 1900. The land is partly under n kind of bagayet and partly under the crop system. The water io the tank was very little; not evon one-third, and we had to introduce a system of

- rotatioo, but the villagers began to intercept water in the upper reaches and we could not control them.
- upper reaches and we could not control them.

  45. Q. I suppose you were working in conjunction with the Collector?—Yes; I refer to certoic instronces in which I came upon villagers who intercepted the water and wasted it: I called the Collector's attention to it and proposed a penal rate, but he said we could not interfere in cases in which permonent bagayet was paid. I recommoded that the offenders should be prosecuted for mitchief. Some sort of legislation is, I think, necessary to keep water more under the control of the Irrigation Department. I also thick legislation is necessary to make the people often the silt. Formorly contributions used to be made by the villagers, and the Irrigotion Department used to clear the silt from the channels. I thick Government ubdicted that system, hecans it was considered illegal. The villagers have to do the ordinary silt clearance, and when the channel is very much eilted ap nader cirsumstances beyond their control, such as from heavy floods, etc., the Irrigotice Department takes the work up. It is very difficult to define where the villagers' responsibility commences and where it cods.
- 46. Q. You coulend that it would be far better if the Irrigation Department did the thing always?—I think not, because it would east Government much more than it does at present. The villagers would be cure to neglect their channels. I think the Putfalla system was the best. It was preferable to the present one.
- 47. Q. (Mr. Ibbetsen) Do you know why it was abolished? The High Court, I believe, decided that it was nu illegal contribution.
- 43. Q. It could be made legal by passing a law?—Yes; I think it is very desirable that some sort of legislation should be passed.
- 49. Q. (Mr. Higham) You were in charge of the Purms" pado taok when it was being built as n famioo relief work?— Yes, I surveyed it, deeigaed it nad carried it out.
- 50 Q. When was the work stopped there?-About last January.
- 51. Q. What is the system ?- This tank is in place of one . that was originally proposed, higher up the river. I was put on drawing up the project in 1896.
- 52. Q. What is the state of the tack?—The side embankments are aearly completed. The gorge portion remains to be done as also the waste weir.
  - 53. Q. The dam is made of earth?-Yes, entirely.
- 51. Q. How many labourers were employed on it?-About 15,000.
- 55. Q What perceotage of work remains to be done?—I should think about occ-third has been done.
- 50. Q. How long were the 15,000 people employed on it?—About eight months; the work was started late; there was some coasiderable delay in getting staction.
- 57. Q. Do you know what famine expenditure was neutred?—I could not say exactly. I think it was a couple incurred?of lakhs.
- 53. Q. Could you not have employed more men on work than you did?-No.
- 59. Q. Sapposing you had had 15,000 ordinory inboarers on the work would you have finished the work?— I do not know whether we would be able to get so moch labour in ordinary years; about 10,000 labourers would be quite sofficient to finish it in one season.
- 60, Q. As a matter of fact you lad 15,000?—They were famine labourers; but they did a fair amount of
- 61. Q. What proportion does total payment to the labourers bear to the netual value of work done by them?-About 80 per cent. I do not know the exact figures.
- 62. Q. Have yoo seen the statement prepared by Mr. Beale ?-Yee.
- 63. Q. Do you accept them?—I think by making a part of the dam of masonry we could store u little more water. I think it is too late now; we could have made the right bank of masonry; I had proposed at first that we should store at least 100 millions cubic feet, but it was objected to.
- 61. Q. How could you store the water?-By putting untomatic gates they would have irrigated a larger urea
- 65. Q. Do you call Mr. Beale's estimate fair?—Yes, it is very foir.

- 06. Q. Did you make any estimates?—Yee; these are practically my figures.
  - 67. Q. No complete estimate has ever been submitted? -Luly a famino estimate.
  - 69. Q. What about the complete project?-I think Mr. Gallagan is proparing it.
- 69. Q. You did not prepare one P-No.
  - 70. Q. The only estimate you prepared was an estimate for relief works?—Yes.
- 71. Q. If the tank is made, it will supply a number of bandharas below it?—No, only two.
  - 72. Q. Is there room for the extension of in igation? There is plenty of scope for that.
  - 73. Q. Would you make now bandharas !- Two new canals are proposed.
  - 74. Q. The canals would be below the bandharas ?- The Landharas are below the capals.
  - 75. Q. You have to pass water down to the bandharas? -Yes.
  - 76. Q. You would have no trouble?—No, there would be no trouble, because it will be a first class work.
  - 77. Q. There would be no necessity to impose a water the P-No, except for the fresh land that comes under irrigation.
  - 78. Q. Woold any fresh land be brought onder irrigation ?—Yes, I think so, especially below Amaluer, where the people are keen to irrigate. They are very well off.
  - 79. Q. You would extend Irrigation on bandharas ?-I think it would be more profunble to extend the present 'Amainer channel than to make a new canal.
  - SO. Q. A great portion of the soil in the Nasik district is not black soil?—No; about our-fourth is black soil.
  - 81. Q. The rest is red !- Red and white marnm.
  - 82. Q. What is the dopth of the red soil ?- About 5 to 6 feet.
    - 83. Q. It is not a rich seil ?-No.
- 84. Q. What crop can be grown on it?-Very good ground nuts.
  - 85. Q. What about sugarcane?-Black soil is very good for augarcano.
  - 86. Q. What about red soil?-With plenty of manure, sugorcane might be grown upon it.
- 87. Q. If you want sugarcane, you have to put down plenty of manure?—Yes.
  - 88. Q. For other crops?-No.
- 89. Q. (Mr. Muir Mackenzie.) Ground nuts ?-I don't think that erop requires much monure.
- 90. Q. For the bandharas you have to repair in Nasik and Khandesh, you take 10 per cent. from the people?-No; they don't have to contribute anything.
- 91. Q. You say sugarcase only requires watering for 15 days?—That is the maximum interval between weterings; it takes only 8 or 10 days ordinarily.
- 92. Q. The interval depends upon the depth of the soil f-
- 93. Q. If you give heary waterings, do they go further ? -- I think so.
- 91. Q. With regard to the distribution of the caunt supply in Nasik, does your establishment control the distributton inside the water-course as well so the Government canal?—No, not on second class works. Of first class works we shut up the shuices, which, however, the villagers can easily
- 95. Q. What is done on the Jamen canal !- That is a different work oltogether; there is no bandhara system
- 96. Q. You have the canal and the water-courses? -- Yes, and the distributaries.
- P7. Q. Do you control the supply of each watercourse !-- Yes.
  - 98. Q. You shut up one and open mother ?-Yes.
- 99. Q. Do you control the water ofter it leaves the watercourse?-No; the villagers distribute it among themselves.
- 100. Q. The canal establishment does not interfere?-No.
- 101. Q. How do you manage the tail of the noter-purce?—The fields at the tail mro generally given water course ?-

- 102. Q. Who gives them the water f-The Patkaris who look after them; the villagers, as a rule, agree among themselves about the distribution.
- 103. Q. Your experience of irrigation works generally is 19 Dec. 01. that the areas fall off in wet years?—Yee.
- 104. Q. In bad years you get very large areas !-Yes; epecially for moneous and rabi crops.
- 105. Q. The worse the rainfall, the larger the area irrigated  $\hat{r}$ —Yee.
- 108. Q. You do not irrigate more in a bad year new than you used to P—Latterly. I think, there has been a tendency to extend irrigation under canals in good years. The people are more keen than they used to be.
- 107. Q. Do you think the people have began to care less about fluctuations in the rainfall?—Yes; but there is one great drawback, that is the uncertainty of the river A storage tank for the Jamda canals would be a supply. great boon.
- 108. Q. Would they take water in a wet year?-Yee, I think they would go in for more sugurcane.
- 109. Q. (Mr. Rajaratna Mudaliyar. In Khandesh, you say there has been scarcity of weter-supply; has the area decreased to some extent?—I know in some villages the area is one-third of the original error. As a rule, I think, there is a decrease of 30 per cent. even in good years.
- 110. Q. That, I suppose, is due solely to the deficient minfall? Yes.
- 111. Q. Is there no deterioration under the channels?—In some cases the channels and bandharas are silted up. The chief munt is that of nusum storage reservoirs; on the Girna. Burrai, and Panjra valleys irrigation would have floarished copiously had there been plenty of water.
- 112. Q. You say, "In Khandosh there is a large number of small village tanks that used to irrigate a few acres of land." Have you ony idea of the extent of land irrigated?—I don't think it ever exceeds 5 acres.
- 113. Q. What is the total area irrigated ?-I have not got the figores.
- 114. Q. Can you think of any arrangement by which the system of application for cauni water could be dispensed with?—The only arrangement that could be made is to place the whole irrigable area under permanent bagayet like the land under second class bandharas. I suggested to Government a few yours ago to place at least a part of the area under the Inioda causis under permanent bagayet. That proposal was, however, not accepted chiefly on account of the short water-sapply.
- 115. Q. You say people have to wait a long time for replies to their applications?—I think a great deal of delay can be avoided if a Sab-Divisional Officer is empowered to grant water appropries Instead of the Executive
- 116. Q. Are you aware that in Sindh no application is required at all?—In Sindh there is a permanent assessment. We have not tried that in this Presidency. At present there is a let of delay in grantin, there applications which deters the cultivators from asking for water.
- 117. Q. (Mr. Muir-Mackenzie.) A Patel on the Jamda canals said that some onlivators owning about 250 nores of land had expressed their willingness to accept a permanent assessment. That is the Bahal village; I think it should not be introduced on the whole of the Jamda canal unless a concentration of the storage tank that is we can ensure a water-supply by the storage tank that is proposed.
- 118. Q. If the supply could be assured, do you think a permanent assessment would be acceptable to the people's -Yes.
- 119. Q. Would it be advantageous to the people?-Yes, there would be more inclination to extend the irrigation of high class crops so that they could get more profit.
- 120. Q. Are you owere that on the bandhara system is 129. (2. Are you owere that on the bandhard system to fixing permanent rate the precurioasness of supply is taken into consideration?—Not everywhere, I am afiaid. On the lower l'anja, where we have got a storage tank, the rate is fair enough, but on other works like the one near Thengoda they have got a very small Thal, and the assessment is Rs. 14, the water-supply being for from perennial. In unany cases the assessment is not fair.
- 121. Q. Do you mean that the enpaoity of the bandhara has been imperfectly calculated P—1 think that is so in many cases, but in some cases it is all right. As for example at Baro Rs. 15 per occe is charged, but they have a small perennial sapply, as it is just below the proposed Chankapur, tank; people have grown rich there exting to the rich quality of the soil.

Mr. L. M.

Mr. L. M. Bose. 19 Dec. 61.

- 121. Q. You would lower the rate on the Jamda?—I should recommend that it be lowered to Rs. 5 per acre.
  - 123. Q. You think that would allow for fluctuations? −Ye&
- 124. Q. (Mr. Rajaraina Mudnliyar) As regards the Visapur tank, I find that about Rs. 8,00,000 have niready been apent; what amount would be required to complete the work P—I could not say exactly; the estimated amount is Rs. 14,00,000. I do not know what the normal expenditure would be; about one-sixth of the embankment lasbeen done.
  - 125. Q. Five-sixths remains to be done?-Yes.
- 126. Q. Do you think that when the work is completed, the sapply wil, be sufficient to reach the waste weir :- Not erery year.
- 127. Q. In normal years ?- No. I think Mr. Beale has calculated that it will fill in 14 years out of every 27 years. I am certain it won't fill every year.
- 123. Q. You say that when the work is completed, it will irrigate an area of 50 s pare miles?—It won't irrigate 50 square miles; that is the area commanded; the area irrigated will be about 8, 00 serie.
- 129. Q. Only \$,000?—Yes, about that; in a bad year it might be a little more.
- 180. Q. (The President.) You say the laid submerged under tank is worth Re. 45 per acres Yes; the hard is not good; most of it is waste land.
- 131. Q In Ahmednagar there are only two second class only sure; they are looked after by the Public Works
- 102. Q. The average annual expenditure for the last ten-teurs on these is Rs. 2.440; the gross revenue Rs. 535. Can you explain why the expenditure is five times the press revenue?—The expenditure must have been incurred in putting the channels in order and rejairing the landharms; it is not a recurring expenditure; it is an initial expenditute
- 133. Q The amount shown under improvements is only an average of the past ten years !—Yes.
- 131 Q In your first note you say, "In bed yours well water has to supplement the cala, water especially for high class crops." Is that invariable the case?—Yes; in the Ahmednapar district to water application is ultimed for suprame or of er perenn'al crops, unless the country has a well in he will be a seen as the country. has a well in his fuld.
- 135. Q For what period do you supply canal water?— This year water non't last for inspect on another fortingle; the canal is a ready nearly empty.
- 136 Q For what period do they use nell mater?—It will be for more than half the period this year, to only half the assessment will be charged.
- 137. Q. Even supposing you have could water enough only to tast for a ferting it, what do you do f-We generally

- serve the perennial crops as much as we can in preference to other crops.
- 133 Q. Do you know anything about the Bhatodi tank? Yes.
- 139. Q. The average revenue is Rs. 4-12-9 per nere actually irrigated, and the working expenses exceed the revenue?—The working expenses include "establi-hment charges"; I do not know that really represents the actual cost of management.
- 140. Q. What proportion of establishment charges is inclined?—It is a very complicated and o'aborate system.
- 141. Q. The carabli-hment charges are out of all propertion to the revenue derived ?-Tes.
- 142. Q. (Mr. Higham.) Are there any provincial works in progress?—Very few.
- 143. Q. The establishment charges have nothing to do with them?—No, they are Local Fund works.
- 144 Q. Dn you charge to the Local Funds n certain percentage ?- Yes 12 per cent.
- 145. Q. The establishment charges are exaggerated figures?—Yes, always. In Khandesh the establishment charges are heavy because the number of works of the first class is very small. To charges ander the Januda Cand class is very small. Ho charges mader the Jumda Canni are very leavy, because the district has not got many first class irrigation works.
- 145. Q. Do the Jamila camble yield a good reroune!— Tes, but the number of high class works in progress is very small and the cetal lishment charges are consequently Arre.
- 147. Q. There is no debit for exhabitehment in regard to second class morks ?- No.
- 119. Q. It is debited to the first class works only ?- Yes. 14). Q There else grain Ahmedisgir are exceptionally high?-let.
- 150. Q What has pened in the case of a Provincial Divi-sion like chotas in f.—The clarics woold not be so heavy.
  - 151. Q. Only 23 per cent, would be charged ?- Yes.
- 162 Q. Trking all the Divisions together, it is too light in some districts and too low in others? I do not think it is too low anywhere
- 183. Q. (Mr. Meir-Markensie) In the last pamgraph of the fact that only n Landful of the labouring clause came on relief works from the rillings lirigated by cander—Yes; I neited that on the Jan d's canals.
- 154. Q. Wenl'it be fair to generalize from that that erers village which had an appreciable quantity of its measuringstet by a Government coral would send either none of its population or only a small proportion on relief works?—Yes One sillage in Planpher, in Khandesh, did not send a single person on relief works. In 1100 when we had a relief work on the Jamba caval for silk character, most of the beloud is come from the neighbouring villages and very for from the villages under the canals.

Applitional notes of witness of Ileication works in Knap of the District.

I hope it will not be considered presumption on my part I hope it will not be considered greenerphon on my part it intends on the valuatle time of the Commission, by senturing to make a few further remarks in recard to brigation works in Khan is shelter, which I unfortunately cuntted in my evidence before the Commission.

2.1 heg to attach a last of storage works in the district which have been investigated what the form time to time and the details of what which are given by Mr. hards in his report. I would divide them into three classes.

report. I would divide them into three classes:—

Coase A—I roductive works—Chunkapur Project is the only one that can be included in this. In the revenue forceast, Mr. Peste has assumed the proportion of crops the same as the last ten years aroung figures on the Lower Panjan works. I keep respectfully to point out that these latter works are situated in the content portion of Contral Khandesh, where cotton, the great enemy of irrigation, is extensively grown, whereas the scape of Chaokapur Project lies in the "Fagiam" that, where the prople, from time immercial, have been chiefly dependent on irrigation from the encient hambaras with recovious people, from time immersion, mare then once, appearance on irrigation from the ancient handhorse with precisions of meta-annile. Cotton is not crown here, and the "Phad," non strigation from the abetent complants with precisions are supply. Cotion is not grown here, and the "Phad," or squadrennial rotation system, is largely practiced in the irrigable lands, and generally as much as 50 per cent of the area ere deroted to supercase, rice, and other high class crops, (Bottom of page 5 of Mr. Pea'e's report.) For this

reason I ber to submit that under the proposed Girna Reft Lank Candland il e extension of existing Landfaras, the proportion of high class crops will be much higher than that on the existing Lower Panjra works, and thus the net return is likely to be more than druble the figure assumed by Mr. Ibale, vie., 15 per cent.; and I family believe the mork will prove to be a productive one. Of course, a productive work of this kind is bound to be "Protective" as well. Experience has shown that famines of the present time for not cross dearth of grain in the country, but want of mores, and couplourent to about that commodity. Systematic development of high elasy irrigation will meason much additional wealth to the tract, and the employment the working classes will find among these irrigated fields in times of famins will be a sufficient "protection," and will obviate the necessity of opening relief works by Government.

Class It—This consists of storage tanks for feeding the existing ancient "Landhams system." Owing to the light cost of the storage, there works are not likely to be directly "Productive." In the six valleys on which these tanks are proposed, three are at present 12,588 acres of permanently, assessed linguisting, under 97 ancient mesonry Landhards. The area used to be much larger over 50 years ago, and even in the recent survey actilement a me portion, has been converted into

"Jigget" (dry crop land), owing chiefly to the paucity of water-supply, which I have been told has been on the decrease, owing to the destruction of the forests in the hills. In 1899-1900 I had been personally over many of the villages, and observed, that most of the channe's censed to flow after December, and in others the discharge was very insignificant, and the loss to the irrigators, especially those that had no wells, was very great. I can quote one village (viz., Antapur in Raglan Taloka) where more than half the "that" had been lying fallow for soveral years, owing to sensity of water, and yet the people and been continuing to pay the full Bagayet assessment. I recommended remission of revenue in this case, and I hope they gat it. Henrissions were granted for several other irrigation villages, but I am afraid the number was small and the compensation was in no way sofficient for the less the people sustained. The people of these parts, unlike those of East Khandesh, are chiefly dependent on irrigation, and if the water-sapply is oneured by the above storage tanks, the irrigation will tapidly develop and the whole tract will be immune from famine in future, and there will be no necessity of remissions. In versa of drought, the emplayment, the laboring classes will find in the fields as mentioned in the previous tractions in the first in the first saving to Governower. These works are meant to introduce irrigation for Governoment.

Class C.—These works are meant to introduce irrigation.

Class C.—These works are meant to introduce irrigation in outliely fresh tracts, where it has rever been practical before, and the projects too are very coath, and in regard to Baigur Tunk there are professional difficulties. They will be very useful for concentration of large number of reliaf workers in times of fomine, and I would recommend these works to be only reserved as such. There is no doubt that in a year of drought the tunk water will be fully utilized for any crops, but in ordinary years I have very gut at doubt as to the development of huch class irrigation, especially under Reipur Tank—as cotton is the earlie 'crop in East Khandech. The Auer Tank being of a accury will abord very little work for relief purposes—and lesides, it is too costly to be tried as an addinary ynterize nork. Karunud Tank may be tried as and discovered has reliclarach cultivated here, but I may add the North Taght region, being close to the Satpidae, rarely schief foundrought. The case of the Munad Tank is unique. The Jamda can do are recent the error of works in Rast Khandech. They have not been funguially successful, but, as the people have bearnt the value of irrigation since their construction, there is no doubt that, if a storage tank channes the water-supply, which is the chief drawhach for. It ligation will extend and flourish, then hat a the same rate as in the case of the other weeks under Class B. The construction of this tank is strongly to commended as an ordinary protective work.

strongly recommended as an ordinary prote tive work.

3. The shore deals with all the important projects in Khandesh, but over and above this, there is a very large reope for smaller lanks of the Parsul type; throughout the district, in fact, one or two can be constructed in reach Talaka or Yetha for inmine relief purposes. I may mention, for example, supplementary tank on the Konoli it feed the Hori system, also similar one on the Puanud, Aram, Panjan, etc. Besides these, there is almost unimited charge with he more or less rained state, all of which already exist he more or less rained state, all of which can give heaple employment for relief purposes. There is also nother very useful form of relief work, that could be statted as text notes in the highming of a famine, rize, slit chanance of existing channels and landbarne. I had recommended this in April 1960, but the famine was too far advanced then, and large concentrated walks were needed. These test works can be undertaken in groups of four or two villages under the supervision of the Civil Department. The above programme is ample for the district and will obvide the necessity of breaking mountain heaps of ractal to waste, or opining roads that the local funds cannot afford to keep up.

1. I am not in favour of construction of acts bendhoras and absences generally, nuless the water-supply of the strong is perensial, or it can be replainfied by storage truks. They only sit up and cross trouble and disappointment. In Shahara and Islands talukas, at the foot of the Satpadas hills (which are full of done toosts and the rabifull is very brays), the etroms, even in lad years, have a perennial flow. I may make particular mention of the Shadada buildhara, and channel (5 miles long) on the Gomai, that has re-tored by famine labour in 1896. In the exceptionally dry year of 1899-1900, the discharce was copous even in April. This small work irrigated (16) acres of dry crops that year which savel the threa villeges from slavration. I think similar experiments should be made on other streams in this region.

I would recommend the amo in Navapur Petha in the remote west of Khandesh (which is really a part of Gujrat), where the mortality during the last famine was very heavy. There are several bandharas here in ruins, and these should be rovived, as the streams here, being near the fact of the Ghals, are more or less personnial. The Executive Engineer for Irrigation is gradually taking up these works as minor works, but these works should be surred on a much larger scale.

5. Much has already been said about the unpreparedness of a district as regards irrigation programme.

Preparation of famine projects, in times of famiac. In 1866 and also 1809 the Collectors of Khandesh and Nasik were very anxious to start irrigation works in place of metal-breaking and read-making, but I was only able to start one work, the Tulmada Tank, in 1869, which was completed in that senson by 3,000 relief workers. The Furnapada Tank was badly wanted for relief purposes in November 1899, but owing to the incomplete cinto of the project, it could not be undertaken till May. If it had been started in the beginning of the senson, I think with the 15,000 workmen uvallable, the whole of this extremely useful work would have been completed by the end of the season. Similarly, I may mention I abivel, Mulber, and Manad Tanks. The project, although roughly ready—some professional points had to be carefully considered by Government regarding them. The puddle trench, being deep, required skillfut workmanship, and until this was completed, the embankment work coult not be started by relief labour. I respectfully beg to sobrid that, if these projects are thotooghly sifted and the skillful portions, uncluding outlet works, etc., are completed as ordinary works, in ordinary years, they can be utilized at once for relief purposes, when wanted, and lace that are spent—in urcless metal-breaking work nould be caved.

desirability of employing a special staff for prerandou of probes.

I would go further, riz, to construct the difficult parts of the more useful projects of class B—as mentioned in the above paragraph, and that nithout faither delay. I believe I am right in thinking that the final report of the Commission will not be ready before July or August, and if the Government wait till then, the special staff will not commence work till the next cold weather. If famine re-appears next year, we shall be in the same plight as before. I would therefore respectfully a ggestibut the special staff should be imponsed now, without waiting for the final report of the Commission.

7. The above recommendations may briefly be summar-

- 7. The above recommendations may briefly be summarized as follows:-
  - (a) Early completion of Chunkapur and Purmapala Tank Projects,
  - (b) Gradual construction of all the tanks of class Bins familie protestive works, in preference to others of class C, as they are intended to improve and extend the existing bandlara irrigation, and are therefore likely to be very successful. A sum not less than one has may be devoted every year for these works.
  - (c) Speedy completion of the juddle treach and other difficult portions requiring skilled labour of Duluvel, Manad, Mather Tanks, so that they may be undertaken as relief works, whenever necessity orises.
  - (d) Construction and restoration of bandharas on percannal streams of Shahada, Taloda talukas and Navapar Petba.
  - (c) Reserving tunks of class C for relief purposes only.
  - (f) Early preparation, by a special slaft, of a complete famine programme, so that one or two tulk projects may be ready for each Taluka or Petha, in case of famine, as mentioned in the latter portion of paragraph 3.
  - (g) To undertake silt clearance of channels in groups, and repairs to old village tanks, as test works in the beginning of a famine.
  - (h) To do may altogether with motal breaking and road making by famine labour in Khandesh, as already too much money has been spent in this direction.
- 8. I trust that the Commission will not consider that my report is too exhaustive. These points I fully intended bringing forwart in my evidence, but as the drift of the questions usked did not lead that way, I unfortunately omitted what I consider to be the chief points in my experience of Khandesh.

Mr. J., M.

19 Dec. 01.

List of Storigs Varke is Khar both Irrigition. Dietrist that kade been proposed and investigated or commenced.

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1	Name of funk.	Talake	Mer. dr.md dr.md	Cathernt in carry mile	Natural Artenation	הוץ כבואה.	Arenza Principal	Arrage irng- ald- arra	F-7-01	Apraef entire per perentin Beginst in	ርሎቲ	Arr. 12b- mer <sub>st</sub> ed.	Are s- ment of col. 13.	Ввилька.
	e)	f1		47		1-	9"	ଚ	93	=	ឡ	13	15	15
	Class d'Predactive   Crariague , Kalum		G'ms	3	Ghat at a said a	5	Dr. A.	1	P.445 Peeda 8	9151	13.25.	1.250	1,250	Work commensed in 1876, nl-rin 1834, and in famines of 1857 and 1200.
	Class	Class B. (Prestreitre).  Digital .   35	Year	S		Very the Arrivers of the Control of	true the Arele for direct Phile transfer.  Driving Parentain Klanters  Kritistica Office and gives by Me Heite.		1 (c. 1 (c.	Wil fool 20 Eductions, present Barres acre 3.750 secret, especie ef re- terisen.	Devils	Dottils not werked up.	م الله	Will submerre land and a village, compensation H51,000. Faddle trench deep over 60 fe, near the river 50:50.
	Dallust . Paultsels .	Piuralnor Kan	Kan Panjes	2 0	16.00		STANTING TO STANTI	1	2,505 54 7 44,45. Privid 68.	\$7,318 s.ru	K 5,77,705 20 lter about.	534 2,110	528	Puddlo Trench deep about 60 ft. on left tank.
	Paragents . Dirlis		Pavi.	-	L L L L L L L L L L L L L L L L L L L	y	10 10 10 10	1 17 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	for trade free uni- tro new excela	£16	0.55,916	0.0	270	Thak storice will be drawn for only seven months; river discharze sufficient for five months in accept years; work started in 1900; one-third embrakment done.
1 - 7	Narkundi . Kabun	Kaltan	Markapili	Abeni SS	-	About the street land in the street land		freeze ly	Willfollers Frank Bas acres, abic ted Je L	Dituits met given by Willson teven lavidateres. Mr. Brite ever be previous Begynnuter 554 Litzier in Klan. dest. fortynien teolet.				
	r matric at a ground displace		to organization of paint	-	had betheresylve, aguittingston	A The Arthurston and Arthurston	designation of the control of the co	district a sensitivity			-			

	MI	nutes of èvide:	NCE.	
	Puddle trench desp over 60 ft.	7,086 Puddle trench on left bank, very deep over 60 ft.	Tank too large for the command by canals.	Tank too larko for command. For smalier tank vasto weir would be costly.
one	2,200	7,086	Forest lands.	6,440
A survey work done.	1,807	वम-१	1,618	4,160
,	11,20,336	About 16 lacs	About 40 lacs	About 37 lacs
890 perce capable of extension.	Average area irrigated by J. C. 2621, acres.	У.И.	Во,	Ni7.
10 Bandhu- ruk.	Will fred Jamda canaly and extension.	7,026 Naw canal in new track.	. Do.	New canal .
a gan nativasi indi ingentir piri gyflani	10,233	7,050	30,200	29,176
	27.5 (25 years).	25-79 (25 years).	(a) Heavy in the bills.	29-29 (10 yeam).
To be presponted for.	1,368	1,393	4,965	3,783
8	Over 50 miles from ghate.	More than away from ghats in Satpudae.	In the Sat- pudas full of forests.	Steep and hilly more than 50 miles from ghots.
ſ	320	250	466	7.0
Bural	Manad .	Armstu .	. Aner .	Wagbur .
Borni starage Nirampur . tonk.	Oldes B (special case).		Chopda .	. Janner East Wagbur . Khandesh.
Borsi starage tonk.	Class J	Class G. Karwand . Shirput	Ancr .	Raîpur
, vo	2	٦	es	m

Norn .- (a) Mr. Beal: gives the averige rainfull of Shirpur and Chopda, which are below the fank site, as 27.57 inches; that on the catchment in the Satpudas is much heavier.

# TWENTY-FOURTH DAY.

# Poona, 20th December 1901.

WITNESS No. 55 .- Mr. M. VISVESVARATA, A.M.I.C.E. Executive Engineer for Irrigation, Peona.

# Anexers to printed questions.

## Ţ.

Mr. M. Vis- Preliminary.—In comparison with other parts of the restaraya.

Presidency, Government have expanded large sums on irrigation works in the Peona District. The Mutha and Min 20 Pec. Cl. Charls are the two largest irrigation works in the Presidence, excluding Sind. The storage reservoir at Bhatghar, which supplies the latter canal, is the largest io India after the Periyar.

All the new irrigation works for which Capital Accounts are kept are situated in the southern half of the district. The culturable area commanded by the works is 259.81 acres, or about 12 per cent. of the total culturable area of the district. There is room for further extension, especially in the northern half of the district.

The following table gives the Capital outlay, Revenue results, &c., of the irrigation works in the Peona District as compared with the works in the Presidency (excluding Sind) taken as a whole:—

	Whole Presidency excluding Sind.	Poena District.	Percentage of (3) on (1):
1	. 2	3	4
Capital expended Laklis Es	203 23	131	50
Area irrigated in 1859-1900 . Acres	101,621	88,742	57
Gross Revenue in 1859-1960 . Re.	2,25,561	1'61'+12	, c7

According to the results of 1893 1909, while the Carliel expended in the d'errict was one-half, the pross recome was two-thleds of the whole. The percentage of mit revenue on outly was 170 as against 07 only for the rest of the Presidency. The reason of more favourable results in this district is that large etorage works which have an unfailing ghant supply have been constructed in combination with carels which reach down to tracts of scanty or nucertain rangel.

Paragraph 2.—The gross area of Poona District is 3,423,609 arres and the culturable area 2,692,754 arres Area protected by Government irrigation works is 137,220 acres only, or 5-5 per cent.

The country is hilly and the culturable area vails from light sandy to yieh black soil, generally with murum from 1 to 3 feet below the surface.

The minfall varies from 185 inches at Loudvil on the ghants to about 23 at Lu2spur in the eistern most tiloka of the district. Except in the grant region, the average minfall varies from 23 to 20 inches, but is generally below 25 inches.

In the western portion of the Poona District there is columnity no demand for water during the southwest monster except for percantal engage the sugarcars and conden crops. Water is required for these at intervals of 10 to 15 days according to nature of a days according to nature of a days along the sugarcary.

Artificial irrigation is almost always in demand in the central and castern parts of the district.

The following information relates to crops mised by irrigation:-

Na'ure of crop		Period of the year wher water is required.		Number of water-	bring the crop to	maturity.
				!		
l'erenotal .	•	All the year room! .		: 20	fo	<b>32</b>
Eight mentle	•	July to end of February		. 12	10	15
Moreson dry		July to October .		; 1	to	4
Do. net		Do		. 4	10	6
liabi		October to Fibreary		3	to	6
Hot wentler	•	April to June .	•	, 6	to	8

The lighter the soil the more frequent the need for water-

Tre distribution of water is central ed by dividing the indicated area into a ctions in charge of Smi-Oversteen and Inspectors and the a client egain into sub-sections, each looked after by a l'atheri who distributes the nater.

The area irrigated is measured each sesson by a special measuring establishment and demand statements are seen in to the Collector for realizing the water-rates

The rate- are levied a wording to the class and area of errors were ed.

Paragraph 3.—Dant constructed of pure black will are nover satisfactory or safe. But black soft is used (a motimes with an admixture of sand) for the learning or one of american dam, with cosings of murum or other satisfact material. Makency care walks are not in use in the 11-ccan.

Black toll is god for angazone and garden only grown by intigation, but it requires monte.

On such a lithere is demand for water for cereals and food-grain ere; sonly in case of prolonged drought. Where there is chrome debricacy of raiofall, there is demand for water every year on black soil also.

Wherever the irrigation is limited to measoen or rabi errps, the demand for water is slack in years of fair or go d rainfull. With a personnal supply available for growing high class crops the demand is more or less seemined.

The revenue in this district depends chiefly on the area of sugarcane and garden every for which water is available. Black soil is better saided for high class crops than any others, and it is no deadminage to have black soil where the supply is personnal.

Owner of black soil desire to have irrigation weeks on necessary of the opportunities they provide for growing juntiana other fordering crops in a year of security religious and sugartane and garden crops during from of near if simfall.

Paragraph 4.—There are six irrigation works in this distict, particulars regarding which are given in (1) the latest Irrigation Revenue Report and (2) Appendix X of my manorandum on Irrigation Works separately submitted to Government.

As the Superintending Engineer on special duty has collected this information, it is not soparately given here.

The annual irrigation capacity and rauge of variation are given in Statement I attached.

The Nira and Mutha Canals can be depended upon in a season of drought. The other tanks are only partially successful in such reasons.

The rivers and streams in the northern part of the district are suited for extension of irrigation to that region. There are none now there except a few small old works of little or no value for irrigation in a season of drought.

Paragraph 5.—I here are nu Provincial irrigation works in the Poons District.

Paragraph 6 - There are very few village works in this district and these are used for drinking water and washing eattle. The construction of village tanks and weirs on small streams can be encouraged if funds are set apart for the purpose. The villagers concerned should be held responwille for their upheep.

The village tanks will provide water-supply for men and cattle. When the tanks ran dry, the subsoil water level in the neighbourhood will be high and wells in such places will supply water for irrigation as well as for drinking and

Paragraph 7. - Construction of new wells can be stimulated by liberal advances to enterprising cultivators who are not in debt.

Enquiries show that during the drought of 1699-1901 the water-supply of wells ran short; unly about 25 per cent. of the wells in the entern part of the district were in use.

Douth of wells varies from 15 to 25 feet in kachcha wells and from 30 to 40 feet in pakka ones.

Cost of pakka wells . . 1,000 to 1,500. " kachelin wells and budkles . 200 to 500.

Paragraph 8,-'I here has been very little damage done in this district by water-logging or excess of water. No

drainage works are required. The cultivators use tee much water when they are allowed with the result that the quality and value of crops suffer.

The rules for distribution and menagement of water which have been in force in this district for the past 16 months provide for light waterings and frequent olesnres of distributary chennels and are calculated to prevent injurious effects from excess of water.

Paragraph 9.—The information under this hend will be supplied by the Seperintending Engineer, Central Division.

Paragraph 12.—Statement I attached gives the initial statistics asked for in Section I of the paragraph.

Information as per Section II is being supplied to the Superintending Engineer on special duty as far as possible. Paregraph 13. - The scale of water-rules is given in

F attached to the Irrigation Revenue Report for 1899-1900.

Applications for water are received by seasons and for perennial crops nanually.

Outlets are opened in rotation and water is given on each distributary from the lowest field upwards. When all the fields are watered, the outlet is closed. Water for sugarcane is given once in ten days as far as possible, except towards the lower reaches where the supply is not constant.

During favourable rainfall the demand for water for cereals and food-grain crops is slack as already explained. For sugarcage and garden crops the demand is more or less constant and is partly independent of ramiall.

The water-supply of tunks in this district is so controlled that they are empty, or nearly so, by the end of June. The smaller tanks dry np earlier. In Lake Fife a proportionately larger supply is maintained to onsure the supply of water to the Civil and Military station of Poona.

The irrigation works got no credit for the increase of land revenue by reason of their construction.

In the Pooun District the charges for maintenance and establishment are fair.

This is not the case in districts like Nasik and Ahmednagar as explained in a separate memerandum.

14. The areas irrigated and the estimated value of crops

NAME OF WORK.			Area trigated.				Retimated Value of Irrigated crops.			
		1696 97	1807-89	1600-1909.	1900-01.	1590-97.	1807-03.	1699-1900.	1900 01.	
Nira Canal Mutha Canal Mutha Tank Mutoba Tank Hasurdi Tank Shir-uphel Tank Bhudawudi Tank	: : : : : :	Acres. 42 543 6.457 1,452 1,129 1,316	Acres. 47,574 12,001 2,988 149 1,523 1,805	Acres, 27,200 8,725 1,211  400 826	Aeres. 51,728 8,201 2,602 15 1 074 1,397	Rs.  82.49,775 13,84,068 2,04,351 77,765 1,17,885	Rs. 12,06,613 11,10,724 1,90,261 2,225 38,362 87,375	Rs. 20,08,095 7,85,657 61,241 39,050 59,384	Rs. 39,78,01 18.92,79 14,21 1 39,85 40,52	
	Toral	52,037	G6,703	88,862	65,110	40,83,204	25,89,560	29,03,427	59,00,40	

The year 1898-99, not being a famine year, is emitted.

All the villages under the first 25 miles of Muthn Canni and for about 60 miles of Nira Canal were protected. only this, but large numbers of people from unprotected tracks also found employment in held operations in connection with brigated crops. The Minor works gave portial protection to from one to three villages only.

protection to from one to three villages only.

Assuming an average cultivated area of 1,600,000 neres for the district, and the yield in a funine year taken at an average rate of its 6 per acre, the total valuation of the produce of the district will amount very roughly to its 96 lakis. The above table shows that the produce due to irrigation varies from 25 to 60 lakis annually. This forms a very appreciable proportion of the total produce of the district, and bearing in mind that the wealth accommulated by means of irrigation works in previous years also helped to mitigate distress, it may be confidently unserted that but for the irrigation works the cust of relief in the district would have been increased by 25 to 56 per in the district would have been increased by 25 to 50 per rent.

# A.-General.

1. The miswers below refer to the Poona District in particular, but opinious of u general nature apply to the Deccan Districts as a whole. I have served in the Khandesh Irrigation District and as Personal Assistant to the Superintending Engineer, Central Division, and have for the past 22 year held exceptive charge of the Poona Irri-gation District.

2. The average rainfull in each mouth of the year in Poona and Indapar, the two representative stations of the district, is as under : -

Mont	<b>.</b>	Peçun,	Indapur.	Remare.
January February March April May June July August September Ostober November December		2.70	Inches. 0 02 0 09 0 28 0 50 1 49 3 03 2 04 1 86 6 90 2 97 0 80 0 03	The average is taken for 10 years onding 1900.

Mr M. Fisvesvaraya.

20 Dec. 01.

Mr. M. Visresvaruya.

20 Dec. 01.

3. (1) No obstacles.

(3) Yes. Slight for high class crops, but not

serious.

(4) Yes. In the case of cereals and food-grain crops which do not require irrigation in a year of normal rainfall.

(5) Yes. Insufficiency of the supply of water is all cases in a year of drought and chronic uncertainty in the case of small tanks on the plains.

(6) No great obstacle from lack of capital in this district.

(7) (The fear of enhancement of revenue exists in the case of well irrigation, though it is in most

cases groundleso (9) These are dealt with in a memorandum separately

submitted by me. 6. As irrigation does not afford any special facilities or advantages for the cultivation of cereals and pulses, except during a drought, irrigated tracts do not attract any large

during a drought, irrigated tracts do not attract any large namber of outpurature. People with capital and enterprize sometime lease, for a time, land under command of irrigation works for growing high class crops.

There is a very strong desire among the people of this district for new irrigation works where there are none and for extended means of irrigation where works exist

# B .- Canals of continuous flow.

7. (1) Two harvests in a year in irrigated tracts are rare, because black soil requires maoure, and during years of favorable minfall people do not go to the trouble of cultivating for two barvests, except where land is valuable.

(2) In this district wherever water-supply is good there is great demand for engarcans and guiden crops. Sugarcano is valued especially because the seed once sown gives from two to three harvests and occasionally up to six.

from two to three harvests and occasionally up to six.

(3) In a year of numblo reinfall there is no appreciable increase by irrigation in the value of the produce of land in the case of ordinary orops. In a year of scanty rainfall ordinary crops are improved by irrigation, and in a year of drought a good crop is obtained by irrigation where without irrigation there would be nose.

If water-supply is available for perennial crops, the gross yield may be increased by about five times, but much depends on local conditions.

depends on local conditions.

8. This depends on the nature of the water-supply and

the crops grown.

(1) In the cess of cereals the gross value of the yield is increased by about 20 to 70 per cent with sufficient mannro.

(2) The crop is saved from total ruin.

9. (1) Ou the Nira Chaal the average water-rate paid to Government is about Rs. 3\frac{1}{2} per sers. On the Mutha Canal the rate is much higher on account of the large area.

(2) About Rs. 6 for ordinary oreps and Rs. 15 to 20 for

(3) Ni, except on second class irrigation works where a consolidated land and water-rate is charged.

In the first case, the rate is paid on the area actually irrigated during the year; in (2) sometimes on actual area and sometimes on the whole holding; in (3) on the whole irrigable area.

10. The expenditure to bring the water to the field varies according to the distance of the Government distributary and local circumstances. The work is usually done

bntary and local circumstances. The work is usually done by the cultivators themselves.

Roughly, the initial cost of the field channels may be taken at about its. I per nore and annas 4 for namual maintenance. For preparing land for sugarcane the rate is about Rs. 16 per nore.

The expenditure is iccurred by the tenant who recoups himself by the value of the produce.

11. The health of the penale is affected when there is irrigation too near a village. Government have prohibited extension of urigation of perennial arops within a quarter mila round all villages under command of canals.

In places, the soil has also deteriorated as noticed by the poor quality of the crops.

poor quality of the crops.

Ou the Mutha Canal, the hand bas got water-logged in a few places, but the aggregate aren is very small. The irrigation under the Mutha Canal is of about 25 years' etanding.

The evil is arrested by the system of rotation now in force. Draining is resorted to by the cultivators with very satisfactory results

# C .- Canals of intermittent flow.

12 to 21. Works of this class are not numerous in the Peona district. I have a general idea of their management, but here no intimate acquaintance with the details.

22. There should be no objection to the construction of 22. Increase and the no objection to the construction of further canale by private persons who own the lands proposed to be irrigated. They may collect the necessary funds among themselves for initial onlay and consent to pay an enhanced water-rate on the area to be irrigated. Government might resist either by a contribution towards the construction of the work or by promising to forego water as-essments for a fixed term after construction.

Before new works are undortaken, Government Engineers should inspect and report on the proposals to ensure that new works do not interfere with the supply to existing carals.

### D .- Tanks.

23. (1) Tanks in the Paona District are replenieded by rainfall.

The Matcha tank is fed partly by rainfall and partly by monacon flow in the Mutha Canal.

- (2) Water is conveyed by channels to the fields to be untered and controlled as described in previous answers.
- (3) In a year of ample rainfull, throughout the year; in year of drought, about the end of the cold weather depending on the rainfall.
- (4) Depends on the size of tank and class of crops watered (vide Statement I attached).
- 26. Yes. When the supply from the tank fails, the cultivators who have sugarcane and other high class crop fall back upon wells for their supply. I consider wells should be opecially occouraged in land commanded by tanks and by the tail persions of canals where the supply is not peronnial,
- 80. The principal distributaries are maintained by the tank establishment; the field channels are kept in repair by the cultivators.

Approximate annual cust of maintenance is about lie. I par acre. With high class crops, it is higher. No legislation scens required.

32. Pleaso see answer to question 22.

The construction of private tanks may be encourged in seasone of drought to give employment to rolled labour. The cultivators require special encouragement and concessions where the laud to be subnetged is not Iném or private laud.

33. The accumulation of silt in Bladalwadi and Shirenphal tanks in this district has been at the rate of 0 83 and 0 09 per cent. per annum, respectively, calculated on the total capacities of the tanks.

In large reservoirs the accumulation is so small as to be inappreciable in a generation. In the Bhatybar Reservoir, under-sluiers are provided to prevent silting.

- 34. (1) The average depth of pakka wells is 30 to 40 feet, and the level of water at the beginning of the hot weather may be taken at 20 to 30 fort below ground surface.
- (2) Chiefly from springs and where the wells are under a canal by percolation from the canal. For purposes of irrigation only about 25 per cent of the wells are useful in a year of dronght.

There are very few localities where the water is saline in this district.

- (3) Please see reply to paragraph 7 of memorandum
  - (4) About 75 years.
  - (5) By mots only in this district.
- (6) By n well of one mot, 4 sores.
- By one of two mote. 8 to 10 neres.
- (7) Varies according to crops and scasone and depth of water, but generally with a well of one mot, 2 to 3 nores of sugaroune, 4 to 6 acres of fruit-trees or fond-grain crops.
- 38. (1) Serious difficulties are experienced in the selection of a suitable spot.
  - (2) Not much diffi nlty in actual construction.

No expert advice is given in this district It would pronote coolidence in well-sinking if such advice were available. If one trained Upper Subordinate of the Public Worls Department is employed for two or three districts, he will be able with the aid of a small staff to take levels and trial borings and thereby offer usefol advice.

39. Yos, to a limited extent.

Welle may be constructed at the junction of two or three fields owned by different owners.

The chief objection is the cost. The Government work will be more expensive, though very substantial, by reason of the cultivators' labour not being utilized.

Statement showing dimensions, cost, variations in results, etc., of irrigation works constructed, under construction or proposed in the Poona District.

of integuesors works constructed, univer construction of proposed in the Loona Destrict.	Works under construction. Works proposed.	Dhadalvadi Sheiphai Khamgaon Victoria Tank Tank (Kara Beervole Clears Looys Lake Fire, Tank, Tank, Tank (Kara Beervole Clears Looys Lake Fire, Tank, Tank, Tank, Tank, Tank, Tank, Tank, Tank, Kara Beervole Clears Looys Lake Fire, Tank,		Hills and fait sidges. Hills and Hills and Hills and At hill flat hill flat hill slopes. slopes. slopes.	23.00 2:33 10.76 42 210 97 43 45 45 22.91 14.92 84.77 108.53	222.00 698 229 299 2,186 5,000 757 973	18-1 The tank will The tank 16-6 20 10-8 9-10 8-60 be feel by will be fiel the Nira by Matha Ganal.	14.63         98.75         16.83         31.20          84          94        <	1,05,078 5,04,161 1,37,661 8,32,705	4,190 38,000 4,000 13,200		41,489 27,096 17,000 6,120	2,27,432 7,50,877 2,08,858 4,50,540 18,70,661 33,23,409 7,64,039 7,31,382 2,000 6,130 976 3,000 18,000 10,600 1,500 1,350	1,895	
roa manning	,	di Shirrophal Tank,		ind Hills and fint hill shopes.	6.00 23.00 15.00 20.48	14-83 305-00	6.7 33.3	1-65 36-32 33-45 54-32 1,252 2,188	1,11,060	4,079	:	46,204	590 2,24,568 150 1,800	189 1,523	
3	Works.	Katurdi Tank		Hills and fat hill slopes.					3 31,433	:	:	:	45,590		_
Consum and	EXISTING W	Matoba Tank.		Hills and flat bill slopes.	10.00	329.00	The tank is fed by the Mutha Ca-	20.78 48.41 6,095	1,16,233	5,634	;	20,477	2,01,422	2,883	
***************************************		Matha Canals (Lake Pife),		Steep hilly country.	196.00	3,933.18	:	162-11 106-70 36-87	23,06,300	3,31,893	16,59,988	1,43,767	66,68,720 16,800	14,061	
to the state of th		Nira Canal (Bhatghar Reservoir).		Steep hilly country.	128.00	6,312.84	123	166.13 126.95 2,993	18,70,98.1	2,23,294	18,52,395	1,91,795	66,85,011 1,13,280	51,728	
A STATE OF THE STA		Particalars.			Aren and nature of extehment Sq. miles Assumed average annual rainfall . Inches Full annuly canadity of tank over sill	of other and the state of the s	outlet on avorage assumed rainfall.	Water spread at full supply Mill. eq. ft. Maximum height of dam		Compensation of land submorged by tank. Cost of canol excluding land compen-	sation, establishment and planta- tion. Cost of distribution channels commen-	sation, establishment and plantation	and indirect charges, 1900-1900. Annual estimated irrigating capacity.  Medium acco, furing in this, the	Minimum years within the	Transport Trinky Co Trining Pro

Note.-The information given under " Worke proposed." Is very rough, as no complete surveys or dotalled estimates have been prepared.

Mr. M. Vis-

Mr. M. Visresearaya.

People and agree to take water for specified areas for a fixed torm of years. The wells should not be constructed too 20 Drs. Ol. close, but at distances varying with the underground supply.

40. Yes. Bulkis, i.o., wells on the banks of nalas, They are useful for mension and rabi crops during years of drought and in ordinary seasons for vegetables and occasionally for perenaist crops. When the rainfall is seanty, the streams also run dry, and their protective value is therefore limited. If a supply of mot appliances with fixtures are kept ready for sale or hire, it will be a great encouragement to well irrigation during seasons of drought.

III.—Explanatory note, dated 31st December 1901, on the evidence given on 20th December 1901, before the Indian Irrigation Commission, by Mr. M. Vieves-caraya, Executive Engineer for Irrigation, Poona.

From the experience in Northern India, Slad and the Madras Presidency, the Gorernment of India neutly associate improved management of Irigation works with extension of area irrigated. They have laid down that many of the irrigation works in the Bombay Presidency were undertaken "with the object of affording relief in seasons of drought" and af "furnishing nearer-supply for cultivation in seasons of deficient rainfall." The impression has therefore prevailed that an extension of irrigated area is expected in seasons of drought, and that the water-supply in such ecasons should be madr available for growing as large an area of food crops and cricals as possibly in preference to percanial and other valuable crops.

- 2. If the works are of limited value in normal seasons through slackness of demand, the Government of India naturally expect a large extension of area in seasons of drought. But there is no large extension nuticeable. When the minfall is normal and the supply abrudant, the staple food crops do not require weter. When the rainfall is deficient and there is demand for water, the rivers are low and tho tanks not full, and the water-supply is not sufficient for the whole area classed as irrigable.
- 3 The members of the Commission have stated that it a memore of the Commission have stated that it is not the desire of the Government of hudla that water should be received for food orops, in a reason of drought at the sacrifice of richer crops, and that no restriction of irrigation of perennial and high class crops is intended in such years.

This interpretation does away with one of nur chief difficulties, and clears the ground for the introduction of suitable measures for making the works more useful and remunerative. If worked on productive lines, the irriga-tion works in the Decem will yield more resenue to Government and do much more permanent good than at present to the area served by them.

4. In clause (9) of paragraph 55 of my memorandum I Proposed where of Re- bave suggested a scheme for pro-trate Menagement of large finably utilizing the mater supply works. works would be protective doring years of searcity and productive in all other years. I have there proposed that the area under each work should be divided into three classes, namely, (1) the fixed, (2) the permissible, and (3) the dry arm. the dry crop.

As the Commission would place no restriction on the irrigation of high class orans in scasons of drought, the scheme can be simplified. I should now have only two classes, viz., (1) the fixed and (2) the permissible.

About two-thirds of the minimum water-supply uvailable may be set apart annually for the "fixed" area. The remaining one-third and any surplus water there may be in good years may be used as at present at the iliserction of the local officers for food grain or rich crops according to the character of the season and circumstances of the locality.

The "fixed" area will be distributed by villager, and each village may be given one or two blocks at a fixed rate of a sacesment per acro on the whole area of the block. Applications may be accepted for, and reaswed once la, six or ceven years.

It would not be desirable to guarantee water to other areas than those meladed in the regular blocks, as the waste of water in the channels will be large. There should be one channel and one outlet if possible to each block, and the water-supply should, as far as possible, be by measure.

If, with the same water-supply, the cultivators irrigate a larger area by a common understanding among themselves, the excess area, that is, area irrigated outside the block, may be separately measured and charged for.

Of the " fixed" area it may be stipulated that not more than one-third shall be sugarcane or other perennial crops.

Also the fixed area should not eccupy more than one-fourth or one-third the total culturable area of the village.

The area should be large enough to make the whole body af cultivators take an interest in irrigation, but not too large to constitute a surfelt or to get water-logged. A small defined area in each village will enable people to concentrate their capital, manuro and skilled labour, and to take the naturest advantage of 1 be water-supply given to them them.

The water-supply to the blocks may be guaranteed for six or seven years at a time as already explained and the rates of assessment revised at such intervals. The area assigned for the blocks may be changed also at each revision, if in the interval any portion of it has deteriorated by water-logging or other causes, or if the people desire a change. a change.

During the mensoon, water may be given to food grain crops and cereals without water opplications wherever the caual is large enough for the purpose. The privilege may he withdrawn by notification from the whole or stated lengths of canal whenever the water-supply is not in excess of what may be required for the "fixed" area.

Farther details may be worked out according to the requirements of each locality.

requirements of each locality.

5. The storage of the Bhatghar Lako is roughly 5,300 million cubic feet. Twa-thirds of this, or about 3,500 million cubic feet, may be set apart for sagarcane and other perennial crops. At two acres per million cable feet (the duty will be larger with black irrigation), this will suffice for about 7,000 acres. Twice this area or about 14,000 acres may be allowed for eight months and four months crops in rotation. Supposing half this area is irrigated outside the monoon months, the additional storage required will be about 500 million cable feet. The total storage reserved for the "fixed" irrigation will thus be 4,000 million cubic feet, leaving 1,800 million cable feet for the premissible ares, including rabi crops at the tail of the canal. tail of the canal.

Water will ordinarily be available for monacon crops without stint over the whole area.

These measures will latroduce an element of fixity into the traction of the tract generally, give opportunities for the application of capital to land and time for the collection of manure, improve the revenue and bring increased prosperity to the villages under command.

6. I was asked why water appli ations should not be dis-Water aggftentione. Water applications controls instances the difficulties likely to arise if the area irrigated were not kept nuder control by incine of water applications.

control by incens of water applications.

In 1899 the water-supply of Lake Fife (Mutha Canal) was deficient by reason of the failure of the later monsoon rains. For two or three year-previously the demand for sugarcane was slack on account of plague and the low price of "gal" or raw angar. So we went on giring water for sugarcane to whoever asked for it till about April 1900. We then found we had only just enough water for cropy alrealy on the ground and had to restrict new sowings. As sugarcane cultivation was particularly profitable in that year, a large number of people had spont money on manure and prepared their lands anatwithstanding they were warned by written notices. We did what we could to meet the demand, but the water-supply fell short of the demand and there was disappointment and complaints. ment and complaints.

In the briginning of 1991 also, people were anxions to put down as large an area of angarcane as possible, so much so that some of them extended their area of came by stealth by utilizing for new sawings the wa'er given for erops stready soun. This had to be stopped by threats of penal assessment. If they had had their own way, the cultivators would probably have doubled the area. In all probability the supply would have failed in May or Jone, and crops valued at about Rs. 15 lakks perished in whole

Again, take the case of the Nira Canal. The shrage at the end of the last monsoon was about 5,200 million cubic

fect. About half the supply is given for sugarcane and bigh class crops and the balance for rabi crops. The rabi supply will be used up before February next, leaving just enough storage to maintain about 5,500 neres of perennial crops till the next replenishment in June or July next. If no restrictions are placed on new sowings, the area would probably go up to 8,000 seres, and the water-supply would initialmost to a certainty in about May next, and crops voluced at over 20 lakks may be runed.

Careful regulation of area is only possible when permission is taken for extensions on regular water applications. Otherwise the water-supply may fail in the hot wenther, and the cultivators may be ruined. It costs Rs. 150 to its. 500 to prepare an acre of land for sugarcane. With borrowed capital, the tisk of even a partial failure will result in loss of confidence and a suddon contraction of area and respected. traction of area and revenor-

7. In Northern India, the water-supply is chiefly from Reasons why water appli-large rivers. They profer to callons are necessary on admit into the cased us much large works in the Peccan, water my they can take; for whetever apply is not drawn poer to waste down the river. They prefer to waste the water, if it should be wasted at oll, along the canal where there is a chance of its being

In Bombay, on the other hand, we draw our supply from tanks or artificial reservoirs, and whatever supply is not drawn is so much saved for further use till the next replenishment. The supply saved may be used for extending the hot weather crops or for new sowings of sugarrane.

The demand for water for irrigation in Northern India is fairly constant. Here in Bombay, the area under an outlet may be 50 acres in one seeson and 500 in the next, depending on the character of the local rainfail.

Water is very expensive in Berthay. In Appendix II of my memorandum, I have shown thus an expenditure of Re. 100 has provided facilities for the inpartion of about five acres in Panjab, four in Madras antion ree in the North-Western Provinces. In Bombay the exact spouding area is less than half an acre. It may be rougher stated that, on account of the great cost of storage, water-capply is three to aix times more expensive here than on the other insignation systems.

more expensive here than on the other irrigation systems.

Careful regolation is important. On the Nira Canal, for instance, the hot weather discharge is frequently not more than 100 cable feet per second in as tunny whice of canal. It is necessary to promibit irrigation at the tall portions of main canal and distributaries, herause more water is lost by percolation and waste in transit than is actually applied to the crops. Regulation is not possible without we know what area there is to water under each cotlet, and for watering which the Canal Department has accepted responsibility. The areas have to be determined beforehind, approximately at least, if the regulation is to be effective.

Remarks on suggested canal should not be classed as permissible." If this were done and water liable to be withdrawn from valuable or ops on the appearance of scarcity, only rich people would risk capital, and there would be no great demand for canal water in ordinary seasons. The expense of using wells for a part of the year is large and the wells may fail. The risk is too great for the average oultivators who undertake oultivation with borrowed copital.

A further suggestion was that cultivators might be given water from year to year till they relinquished the area. This, if followed within safe limits, would be an improvement on the present system. The objection to it is the loss of water on a net work of distributory channels which are necessary for maintaining scattered patches of irrigation. The loss of water, especially during the hot weather, would be out of all proportion to the area watered. Concentration is most important for economizing the supply in the hot weather. Hence my suggestion for irrigation by blocks and the allotment of one or two blocks to each rillage. The blocks may be shifted from one part of the rillage to mucher once in six or seven years as

O. While I believe water applications in some form Water applications may be or other ure a necessity on large dispensed with for small works, I have advocated their nbolitian in the case of the smaller works. I attach much importance to the suggestion made in section (10), paragraph 55 of my memorandum, to sabiah Than motorana. which I hog reference.

10. Closely allied to the recommondation in the previous

Management of small the transfer of small works to the transfer of Management of small works by Civil Agency.

(6) and (12), panagraph 55 of my memorandum. Works conting, say, less than fls. 3 lakks, may be so transferred. Important or difficult engineering works may be maintained by the Public Works Department, but the maintenance of minar works, channels, stc., may be left to the villagers, nador some recognized rules, for control by the local Revenue officials as in the case of the second classification works. There are too many small works borne on the list of works for which Capital accounts are kept in this Presidency. The capital expended on works in Bombay is only about seven per cent. of the total expenditure for all India, but the number of works here is 40, out of a total of 124 (rhide paragraph 15, also Appendix III of my memorandum). Small works are an exception in other Provinces. They should be constructed by the Public Works Department, but may be managed, as in Madras, by the Revenue Department. The revenue on these works is assessed and collected under rules not suited to them, the funacial results are unsatisfactory, and, as the results affect irrigation works in the presidency as a whole, the larger works suffer by association with them.

# IV .- Memoraudum on Irrigation Works in the Bombay Presidency, excluding Sind.

# 1 .- PRELIMINARY.

During the successive famines in the Deccan since 1890, During the successive famines in the Decean since 1890, the coostruction of a number of irrigation works, principilly tanks, has been nedertoken as relief works. With the re-establishment of ordinary agricultural conditions, the works are being closed one by one; and the goestion now arises whether the works should be left incomplete, until perhaps there is demand for them in a future famine, or they should be pashed on and brought to an early completion. Are the works to be regarded merely as aids to famine rollef, or have they any higher value justifying the onlay and construction for their own sake? Before attempting an answer to this question, it is necessary to examine carefully the results of the irrigation works, already constructed in the Presidency, in the light of similar results of similar works in other parts of India.

similar results of similar works in other parts of India.

2. A comparison of the financial results given in Appendix IV clows that the net return for the year 1899-1900, on the Capital outlay on irrigation works in Bombay, was 1'd per ceed, while the average for such works for all India was '6'd per cent., and the maximum for any one province amounted to nearly 10 per cent. Comparing the areas irrigated in the same year (Appendix II), it will be seen that, while in every other province with the exception of Bengal, irrigation kept pace with the facilities provided, about a third only of the irrigable area in Lioubay was actually irrigated.

3. Opinion of the Government of India.—These results which have been more or less the same in all recent years, have discredited the Bombay works in the estimation of the Government of India. The nound grants for new works have in consequence been curtailed and the strictest economy

No. 23-1, dated the March 1813; Review of the Bombay Irigation Reviewe firm Reviewe firm Reviewe Report, Resolution noted in the maintenance of March 1813; Review from the Government of India 1801-92.

the Account Frequency in the State of Inches in the Margin is a Resolution noted in the margin is a forcible expression of the opioion of that Government on the operation os a whole:—

1. The irrigated area of 1801-02 shows an increase of 21,207 acres which is said to be due partly to an increase demand for water cased by deficient rainfall and partly to a the axional for water acres of the reaches of the proper of the demand for water cased by deficient rainfall and partly to the extensions carried out en some of the works. Considering that drought prevailed over n large area to the Decean districts and that many of the major and minor works under notice were undertaken with the object of affording relief to that area in soasans of drought and that the nercoge brought under command of a water-supply is very largely in excess of that for which water was taken, the increase in the irrigated area is much souther than might have been expected. Viewing again the large expenditure incurred in the construction and upkeep of these works, the Government of India cannot regard as attisfactory the results obtained, and will be glad to receive from the Government of Bombay an explanation of the from the Government of Rombay an explanation of the reasons why greater progress has not been achieved in

Mr. M. Vis. extending the irrigated areas below new works of irrigation resvarays.

in the Deccan as to the efficiency of the several works in farnishing a water-supply for cultivation in seasons of deficient rainfall nad whether they are worked with careful regard to their offsective utilization for that service."

regard to their offective utilisation for that service."

4. Object of this memorandum.—One of the objects of this memorandum is to bring into relisf the special features which differentiate the works of irrigation in Bombay from those of other provinces. For instance, un extension of the irrigation of the monsoon or other food-grain crops almost everywhere in India means an increase of revene and improved returns on Capital outlay. But this is only partially trus in Bombay. In 1895-97 the total irrigated area in Bombay exceeded that af the previous year by 674 per cent, but the corresponding increase in the ussessed revenue amaunted to 22 per cent, only. This shows that there are certain distinctive features in Bombay irrigation which have to be reckened with, and which might necessitunore are certain distinctive features in Bombay irrigation which have to be reckened with, and which might necessitate meditiontions in the eyetom of administration and assessments to adapt them to local conditions. The directions in which changes may he made with advantage will be indicated and the question will also he discussed as to how far the results and possibilities of these works justify the unfavourable estimate formed of them.

the unfavourable estimate formed of them.

5. Class of Irrigation works considered and basis of comparison.—The irrigetion works considered in this memorundum are those chased as Major and Minor Works for which Capital and Revence Accounts are kept in the dinancial accounts of the Government of India. The results of working of the official year 1899-1900, us given in the Government of India Review of Irrigation Works in India for that year (vide Government of India Review No. 859.—C. W. I., dated 28th July 1901) will be taken as the basis of comparison for the various provinces. Though the year was marked by famine conditions over a large prea, the results of that year are fairly reliable so ngaide to the relative value of the several systems at the present time. The results of other years will also be referred to as occasion requires. Out of the total outlay on new irrigation works in the Bombay Presidency (Decean and Gujarat) more than 30 per cent. (vide Appendix IX) is invested in works in the Docean. Whenever, therefore, Bombay works or Decean works mentioned in the Irrigation Revenue Report for Bombay (excluding Sind) are meant. Sind is treated as a separate province for purpasse of this comparison.

# 2.—Conditions of Irrigation in Bombat confared with other Provinces.

6. Financial results of Irrigation works in the various provinces.— Details of Capital ontlay and percentages of net revoune for Major and Minor Works for which Capital Accounts are kept are given in Appendix IV, from which the following figures are extracted:—

Province.	Total Capital Outlay to and of 1 899-1900.	Percentage of not Revenue on Capital Outlay, 1g39-1300.	Remarks.
Bombay, Deccan, and Gujarat Bombay, Sind North-West Provinces and Ondh Panjab bladras Bengal All India, including Minor Provinces	Million Bs. 26-78 21-75 90-14 96-68 81-57 62-35 389-78	1.4 8.7 7.2 9.9 7.4 0.7 6.4	Worke in the Minor Provinces costing oftegether about 105 lakes are not separately considered in this comparison.

Out of the total outlay of 3892 million rupees, Bombay has received a little over 262 millions, or nearly 7 per cent, for its chare. During 1892-1900 four of the above six eystems gave a return of over 71 per cent., Bombay gave 12 per cent., and Bongal less than 2 per cent.,

7. As a succession of unfavourable seasons in various parts of the country since 1896 created a demand for irrigation and in parts diminished the water-supply, it may be interesting to compare the above with the results before

The following table gives the corresponding figures for the year 1895-98:—

· · · · · · · · · · · · · · · · · · ·	•		
Province.	Total Capital Ontlay to end of '835 f6.	Porcentage of not Revenue on Capital Outley, 1895-96.	Romarks.
Bombay, Doccan, and Gujarat Bombay, Sind North West Provinces and Ondh Punjab Magnal Bongal All India including Minor Provinces	Million Rs. 26-07 14-57 84-69 82-04 76-47 62-30 853-34	1·2 6·7 ·3·2 ·5·6 ·7·1 ·0·2 ·4·3	Works in the Minor Provinces costing altogether about Rs. 72 lalks are not soparately considered in this comparison.

The comparison above a marked improvement in the North-West Provinces and Panjab.

8. Comparison of areas irrigated before and after the famines.—The total areas irrigated on Major and Minor Irrigation Works for which Capital necounts are kept during 1595-96 and 1899-1900 compare as under:—

Province.	rovince. 1893-96. 1899		Porcentago of increase.
	Aores.	Acres.	
Bombay, Deccan and Gujarat	76,149	105,829	39
Bombay, Sind	. 7,05,038 be n	1,572,457	.00
North-West Provinces and Ondb	tion 216	2,830,945	41
Panjab	8,0ut 119	4,957,891	57
Madras	2,540,317	3,256,311	12
Bengal	579,693	727,026	25
All India, including Minor Provinces	10,000,128	13,921,756	39

9. In Appendix V n camparison is made between the several provinces in respect of physical features, local peculiarities of cultivation, assessment, etc.

Bengal.—Bengal hes an ahundant rainfall, and irrigation is not practised in that province as an ordinary part of cultivation. Rice is the only crop for which irrigation is practised extensively in this province. Ont of 754,577 acres irrigated in 1899-1900, 691,073, or over 78 per cent, were under rice. As Boagal shows even less favourable results financially than Bombay, that province need not be further specially considered for purposes of this ounquiry.

specially considered for purposes of this ouquiry.

10. Sind and Punjab.—In Sind the rainfall is very scanty, and cultivation is ulmost entirely dependent on artificial irrigation. Extension of cultivation is dependent ulmost entirely on the facilities for irrigation. The annual inundation of the River Indus fertilizes the soil, and the people are used to irrigation. Many af the old canals have been improved and extended. The new canals are constructed at a comparatively small cest, and are extraordinarily remunerative. The conditions in Sind and in South Panjab, where the practice is similar to Siad, are totally different to Bombay. In North and East Panjab the conditions are somewhat similar to the North-West Provinces, and will be referred to in speaking of that provinces. will be referred to in speaking of that province.

will be referred to in speaking of that province.

11. Aladras.—In Madras, again, the most extensive irrigation is in the deltas of the epring-fed perennial rivers like the Cauveri, Krishun, and Godavari. Irrigation is also practised from tanks chiefly for growing rice. Rice in that province is both a monsoon and rabi erop, and is not ordinarily grown without irrigation. The principal use of irrigation in Madras is the stimulus given to rice cultivation. Out of 3,229,024 neres irrigated in 1898-99, 2,977,008, or 92 per cent, were under paddy or rice. If rice is excluded, other irrigation, including the perchaial, is mall. Irrigation is thus mainly a question of rice cultivation in Madras.

12. North-West Provinces.—In the North-West Provinces irrigation is practised from large canals taken from rivers like the Gauges and the Jumna. These, rivers are fed by the Himnlayan snows, and contain a large supply of water throughout the year. As the minfall conditions in the North-West Provinces are similar to Hombay, a good crop cannot always be depended upon in ordinary years. The difference between the two tructs, however, is that while monsoon or dry crops always benefit by irrigation in the North-West Provinces, the soil of the Decean is such that irrigation is only of partial value for protecting the staple crops of the nrea except during severe drought. The area under wheat during 1803-09 was 895,389 acres out of a total irrigated area of 2,253,802, or nearly 40 per cent.

13. Decean, rugged and broken.—Unlike the plains in

13. Docean, rugged and broken.—Unlike the plains in the North-West Provinces and the river delias of Madras, the Decean country is hilly and undulating, and the con-struction of large canals, where feasible, is a matter of

great expense.

14. Necessity of storage tanks in Decean Irrigation.—
Wherever irrigation is extraordinarily remanerative in
India, it will be found to be dependent on inundation or
perenulal flow. There are no perenulal rivers in Rombay
fit for irrigation on a large scale without the aid of storage
tanks. The rivers on which patches of irrigation exist
carry large volumes of water in the monsoon, but they
either dry up or dwindle iate small streams of little or no
value for irrigation in the bot meather. The cold weather
supply is also small. For irrigating the higher classes of
erops it becomes necessary to store water in the monsoon erops it becomes necessary to store water in the monacon for supplementing the natural flow of the rivers throughout the year as required.

16. Works small and scattered.—Again, the Deceme works are small and scattered unlike the large system elsewhere. Out of 124 works in India for which Capital Accounts are kept, 49 me in Bombay (Appendix III). The average cost per work for all India is 803 laklas of rapecs, while that of the Bombay works is 62 laklas only.

In large tanks there is comparatively less ioss of water in the second of the second o

16. Labour scarce and expensive.—In the North-West Provinces and Oodh the density of population per square mile is 486 (Appendix I), in Madras 262, and in Punjah 189; while in the Decean, where the greater number of Bombay irrigation works lie, it is 165. The population is sparse and labour is comparatively scarce and expensive in the Deccan.

17. Comparison with Madras tanks.—The only other province, besides Hombay, where tanks exist on a large scale is Madras, though even there tanks are not the mest successful irrigation works. The reason why tanks in the Madras Presidency are more reunnorative than in the Decae is that they are nosity of native origin and the Decao is that they are nostly of native origin and the Capital ontlay shown against them rapresents in most cases the cost of improvements only and not the real total cost. A large number of the smaller tanks (not works for which Capital Accounts are kept) perform a useful office in Aladras, namely, to protect the rice crop daring a break in the weather, while similar tanks would be of little use in Hombay. The small tanks collect water in a heavy downpour and give out during a break for the rice crop. In most tanks there is very little water left at the end of the cold season.

The soil of Madras in the districts where tanks are formed is generally more retentive, and the loss of water by leakage and absorption is less than is noticed from tanks and canals in Bombay.

18. Oss per acre of irrigable area high.—According to the reports for 1809-1900, the total irrigable acreage under command of irrigation works in the North-West Proviners is 3,076,000, and the Capital outlay on the works amounts to Rs. 901 lakhes, giving a rate of Rs. 29 per acre. The corresponding figures for Bombay are 316,425 acres and Rs. 268 lakhs, respectively, giving a rate of Rs. 85 per acre. The comparison is really more unfavourable than these figures indicate, because while nearly the whole of the area classed as irrigable is anothly irrigated in the North-West Provinces, the area actually watered in Bombay is about one-third only of that estimated to be irrigable.

10. Preponderance of black soil, Properties of black soil.—A good harvest can always he seemed in the North-West Provinces by supplementing the natural rainfall by artificial irrigation, whosever the former is found to be deficient. It pays the cultivator to sock the protection of the canal and to insure his even by contributing a small

water-infe. In the Decean, although similar elimatic Mr. M. Visconditions prevail, the soil is not favourable for the vesuaraya. irrigation of the staple crops of the province. Black soil, which is derived from trap rook, prependetates in the 20 Dec. 01. Decean, and black seil has a peculiar property of resisting ovaporation.

"The ullavial soil of the North," says Dr. Voeleker, "lands itself rather to eausis, wells and shallow ponds and the rocky ground of Madras to the tanks as well as to channels, while the central or black cotton soil needs neither particularly." The same authority says that "the retention of exersive moisture in the soil produces a state of stagnation and coldness unfavourable for the supply of clast food." plant food.

plant food."

20. Black soil does not freely lend itself to irrigation.—In good seasons the black soil of the Decean yields a full harvest and in ordinary years a fair harvest. During a partial break or drought, canal water is not sought for to save the dry crops to the same extent as is done in Madras or North-West Provinces. Such waterings are even found to be harmful in certain places. It is only in a year of severe drought that irrigation of dry crops is really useful, and that there is any large demand for water for them. Also, irrigation without manure is found to impace of the black soil. porerish the black soil.

21. Principal food crops not dependent on irrigation in Bombay — The rhief stimulae to irrigation elsewhere is the demand for water for food-grain crops. This is wanting to the Decean. In the North-Wost Provinces there are two crops in a year. The area under wheat prependerates. Coin, cotton, and other principal crops are grown in the rabi season and require irrigation. In Madras, as already remarked, both the early and late rice require irrigation. This is why irrigation is so extensively practised in these provinces. in those provinces.

22. Bembey cultivators not used to irrigation.—Are ference to Appendix I shows that the proportion of total irrigated area to tetal cropped area in Bombay in 1899-1900 was 4½ per cent, in Madras 25 per cent., in Puajab 72 per cent., and in the North-West Provinces and Ondh 33 per cent. The irrigation, here referred to, is from all sources, not merely from the Capital Account works with which the present enquiry is concerned. The figures bring out prominently the fact that irrigation is not an ordinary accompaniment of cultivation in Bombay.

One reason why well irrigation is not largely practised in the Decean and Madras is that the sub-soil over wide areas is rocky, which makes well excavation a matter of great

23. Dry-rrop irrigation will not pay in Bembay.—
During 1805-66 the area irrigated in the Decean and
Gujamt was 74,023 nerse, and the assessed revenue from
water-rates amounted to Rs. 4,52,476. During 1897-98,
though the area was to 126,516 nerse, the revenue amounted
to Rs. 4,93,139 only, so that with an increase of 69 per
cent in area the increase in pagenta was about 9 per cent cent, in area the increase in revenue was about 9 per coat, only. In 1897-98 there was a considerable increase in monsoon and rabi irrigation due to drought. The rate for monsoon and rabi irrigation due to drought. The rate for mensoon dry crops is generally Ro. 1 per acre, and that for rabi crops its. 2 per acre. At present the average working expenses amount to more than Ro. 3 per acre. If the whole of the area estimated to be irrigable at present, which is about three times the area actually irrigated annually, were put under monsoon or rabi crops, there would be a reduction instead of an improvement in the present revenue from water-rates.

The works may justify their oristence as "Protestive Works," but the accounts will get no credit for mero increase in area. Increase in the irrigation of ordinary crops will never pay in Bombay. Water is too costly to be profitably applied to them.

presitably applied to them.

24. Financial success bound up with improvement in high class cultivation.—Daring 1889-1800, although the area of percental crops irrigated was only about 12½ rerect, the value of trigated crops from the area was 47 percent, of the whole. The area under perennial eight months, and special bot weather crops, for all of which high rates are clarged, was only about one-fourth of the total area, yet the assessment on these three classes of crops alone paid ever 70 per cent, of the total water-rates of the year (bustement G, Irrigation Rovenne Report, Bembay). If the Bembay works are ever to prove remunerative, percundul and other high class irrigation should be largely encouraged in ordinary years.

If protection is the main object, and water-supply is to be reserved for dry crops, which may or may not take it while it could be otherwise profitably used for growing,

Mr. M. Vis- Percunial crops, a substantial contribution from land resonne resourage. should be credited to the works as is done in the North-West Provinces and elsewhere.

20 Dec. 01.

'S.—Present position of Irrigation Works in Decean and Gusabat.

25. Importance of irrigation scorks in the Central Dirision.—The following figures (Appendix IX) give the distribution of the works and the Capital outlay on them, among the three Public Works Divisions of this Presidence.

		Cests. Lakks of Rupecs,	Remarks.
t'entml Division .	30	211	Works under con-
Southern de	16	41	abernaceure not included.
Northern do. (Gujarat)	2	8	incluara.
Total .	36	263	

The Capital antlay on works in the Central Diricion is over St per cent, of the total irrigation outlay in the Decem and Gujarat. The greater number of the works and the most urputant of them are in this division. The area of uncertain rainfall in the Presidency is also the Director.

26. Works in the Northern Division.—There are only two Capital Account Irrigation Works in the Northern Dirision (s. e., Gujarat) coating together about 6 lakbs. There are the Hathmati Cayal and the Klani Cat. neither of which paid its working expenses during 1800-1600. In favourable seasons the former pays about 1 per cent. and the latter 2 to 6 per cent.

27 Blocks in the Southern Division.—In the Southern Division also there are few marks in arous of sounty or unsersonable rainfall. Almost all are however, useful on the occurrence of a drought. The intract went which is the fishal Urnal, let Soction. Lasguer a little over 18 likks. The Kilshna Canal is absulted more they by likks. The former is new and the latter wants a steam received. The question of providing storage arches for the Krishen Canal is mader consideration. The remaining tanks, if which there are only large at tangence than one likk (the largest met exceeding seven laths), call for no remain.

One perdicately of the Pharman table is that waver assessment recallected on some of them along with land revenue as a consolidated cats.

15. Works in the Control Division.—Affact all the works in the Control Division are either either by access of sensity mutall or affact prote time to such areas. The largest are the four felloming.—

4 4 4			Centin Jakka et Enpera	he nesta lando i Anchemiel Sinia lando in,	Fence-last of Est Irl fa 13 Gallay.
				lis.	
Matha Canals		•	€7	2,07,174	នអ
Nita Canals	•	•	37	65,107	150
Mbasrad Tank	•	•	21	20,195	1:26
Ekrok Tank		•	135	20,785	1.23
Tital for all ri	514 T.		13q}	3,54,5./1	2.11
works .			1 3013	49,404	0.55
Total, Dec Gujar	· ·	<b>.</b>	263	3,55,185	1-1/1
			,	4	•

The set revenue from these four works fermel 63 per cent, of the total net resence. The retaining norks in operation taken together poid less that I per cent. The first two works of the four mentlined above may less considered as very successful works, although the revenue is not yet sufficient to cover the annual interest expected upon

the Capital outlay. The Mutha Canal is the oldest work. Though constructed primarily for famine protection, a large part of its revenue is derived from the water-sapply to the Peana City and the irrigation of the sugarcane cross. The canal is single-banked, and therefore expensive to maintain.

canal is single-banked, and therefore expensive to maintain. The Nim Canal is the largest and the mest recent work in the Presidency, and it gives every promise of successful working. It has proved its great value in the recent famine. According to the results of 1900-1901 (a famine year) the canal irrigated by Capital Account works in the Decean and Gujarat during the year. The value of crops amounted to about 40 lakins of supers. It is calculated that the area of food-grain crops freighted gave crops sufficient to feed a population of more than 12 lakin for six months. Without the canal the greater part of this area would have remained uncopped in such a year.

litt the Mutha and Nira canals are provided with storage tanks having ghat catchments. The remaining two works mentioned above are on the Deccau plains. Out of them, the Minavad Tank, had ind its full supply level restored only recently, and the Ekruk Tank is handicapped by the unentisfactory state of its canals, which, being single-bankel, are expensive to clear and resintain. Both tanks are in areas of scanty rainfall, and do not fill during years of famine.

29. Principal proulisations of Decean Works explained in Appendix A.—The principal conditation of each of the 38 works will be understood from the information given in, and the brief explanations entered in the remarks column of, Appendix X, to which reference very he made.

Of the 26 works in operation, eight imputant ones are dependent on elvers with a previous water-supply. Until storage tanks are provided for the latter, the best results cannot be had for the knoney invested in them. Nearly half the tend outlay is on norther which are admittedly incomplete or not in full quarter.

10. Generally Horden Works have not entired expectations—The following are the principal reasons why the expectations formed of the Decem works when they were first projected nearly 30 years and fore not been realised to

(i) In the early days of irritation it was accorded as an action that water was tally to be brought to the find to be used. Raperious with the black soft contry has shown that extended discovery irritation is not to be level for except in a year of sourced tought.

in the principal to degrain crops of the Becom are onto soly grown with at irrigation. There is no demand either for wheat, which is extensively grown in Parish and Aurit-West Provinces, or for rice, which is the principal professed crops in Friends and Regard.

frigition crap in critical and normal.

(bit) Any then, it was thought, would afford irrigation for thy crap. As the mens, it maters upoly is abandant, extensive dry-crap irrigation was cracked position and large areas necessitizate has irrigable in an ordering year. The areas there are given by extincted have been forelisted extensive, and the estimates have been considerable acquired within accept year.

(it) In the original estimates sufficient allorance was not rich for also prior, lechage and waste, and high duties were mainted. An examination of the working of the Mutha Cara's in 1824 showed that the date of water on that eanily had been correstimated. Similarly, enquires on other matha have regulated in large reductions in the duties originally seemed.

(v) Countrainment which and leader.—The canale mero desympt in the early days of irrigation with charle bancs. The idea was that example would keep out with. Thus has been outralisted by the experience of example the the Matha, Fland, and Januda, which are singled calculated which require large some annually to clearance with.

Sufficient allowance was not made for leakage, which always takes place in musical ground. The live ship time already referred to, in connection with the Mutta Cind in 1941 array tel the accessity of restricting origation, riller than send them water a great length where westage was out of prejection to irrigation.

Fallfelling or previous of a rore of pulle is expensive, but it had to be not rued to stops ome of the larger leaks on the Musha and Nico Canals.

(e) The croprate system induces the cultivator to raise up to the last more at the raiself before thing could water. He then takes either too med water or too little, generally too much when he can, and the count mater gas the discredit for any damage to the crep atture you an exercise or minus.

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The formalities of the water applications and special measurements, etc., are also obstacles in the way of extension

(vil) The country being uneven, levelling and terracing are in some places exponsive, and the cultivator, unless forced by drought, does not often think it worth his while te prepars his field and the channel necessary to lead water to it.

(vii) The rain water deposits its silt in storage reservoirs, and thus loses a great deal of its fortilizing quality before it is distributed for irrigation.

(ix) Capal water is considered too cold for garden calti-

(x) Can't water is considered too garden canter ration, and well water is often preferred. (x) The Decem caltivator is heavily involved in debt. Irrigation of personnial crops requires capital and manure. Plack soil requires a liberal use of manura to fertilize it. He does not often trouble to collect manure himself, and is too poor to prichase it.

# 4.—STETEM OF ADMINISTRATION AND ITS EFFECTS ON TINANGIAL RESULTS.

31. The reasons given in the preceding section for the disappointing results on the Bombay works are based on unfavourable natural conditions and partly on the defects or incompleteness of the works themselves. It will next be considered how far the system of administration, accounts,

and assessments has operated in the same direction.

32. Reference.—Appendix VI is an anthorizative statement explaining (1) the classification of works for purposes of account and (2) the sources from which funds are

derived.

Appendix VII gives a summary of account rules and Government orders in force for regulating establishment

Sintement I-C attached to the Annual Irrigation Revenue

Statement 1-U attached to the Annual Irrigation keyonue Reports gives the main heads of rovenue and expenditure. 33. Administration of small Irrigation works.—The 36 irrigation tanks and canals in the Doctan and Gajsrat are spread over several districts. There are special Excentive Engineers for irrigation works in Khandesh, Poon, and Dharwar, but in all other districts the works are looked for the learnith and hardling and these mith several products. after along with reads, buildings and other public works by the Executive Engineer of the district concerned. On small irrigation works, he is assisted by a Pahlic Works subordicate, who may have several reads and buildings in his charge at the same time and who often has no epecial training or aptitude for irrigation work. He generally has no information on the financial results of his work. He gets instructions to debit such and such a charge to such and such a head of expenditure, according to certain rulings of the Code and the Examiner, not understood by him. If he does this and submits the usual statements on prescribed forms and sees that there is nothing vory wrong about the upkeep, his duty to the irrigation work is discharged. Except in the special irrigation divisious, the Exceptive Engineer has his hands full with other work. As severe economy is onforced in maintenauce, he finds it a struggle to ensure bare efficiency of the tenks and cannls in his charge from a professional point of view. In judging of the efficiency of management, Government take into account both increase of area and not revenue. So, it is not clear to the Executive Engineer whether the water-supply should be reserved for valuable crops which pay best or for protect-ing food crops which pay least. He might try to extend ing food erops withou pay teast. He higherly to extend irrigation by a few norce every year or eave a few hundreds by reducing expenditure; and he would persovere to do so if favourable results followed his zeal for efficiency or economy. But he finde all his efforts rendered unavailing by a system of book debits made in hie office and by the

Examiner, under which it is often impossible to show reli- Mr. M. Vivable working results.

34. Book debits under 'Interest charges'.—According to the Interest of the Interes

34. Book debits under Interest charges.—According to the Irrigation Revenue Report for 1899-1900, the total balance of interest charges on major works up to the end of that year amounted to Rs. 1,25,18,353. Under present rules, fatorest during construction for major works in progress is calculated at 3% per cent. per summ on the oatlay at the end of the previous year plus half the outlay for the year itself. Funds are provided for new works according to the financial exigencies of the Gevernment of India. The fact that the construction of a work is prolonged, ie in most cases due to this reason, rather than to the necessities of its execution. Prolonged interruption is in itself the very reverse of beneficial, but when the interruption is caused because funds are not available, or a design is not completed or approved, the accumulation of interest charges in the interval becomes a mere matter of form.

Taks for example the case of the Chankapur and Maladevi reservoirs. Both these works have been in aboyance for many years past (the Maladeri Tank work was recently re-opened for a short time as a relief work): in the one case because there were no fuads, and in the other, besides case because there were no fuads, and in the other, besides want of funds, there were doubts as to the saitability of the design. All the same interest charges are being added to the total sum-at-charge. Up to the end of 1899-1900, the work's expenditure on the Chankapar Tank was Rs. 60,495 and the interest charges in the Administration Accounts amounted to Rs. 49,608.

35. Book debits under 'Working Expenses'.—The nature of charges for maintenance and management is explained in Appendix VII. Percentage charges were made for establishment under fixed rules instead of the actual expenses under that head. Appendix VII shows that the expenses of revenue management are affected by

that the expenses of revenue management are affected by various fortuitous circametaness such as the classification of a district into Imperial or Provincial, the progress of large Capital Account works in the district, the extent of the yearly grants for other works in progress in the same executive division and so forth.

To take a specific instance, the Nasik District is classed as an Imperial Irrigation District, though the emesca as an Imperial Irrigation District, though the expenditure on Imperial Irrigation works bears a very small proportion to that on Provincial and other works. The result is that these other charges are debited with authorized perceatinges for establishment and the balance of the establishment of the whole district is written off en maste against Irrigation Major Works (working expenses) and Miner Works for which only itevanne Accounts are kept. The Excentive Engineer, Nasik District, mentioned these circumstances in a report in 1898 and quoted the following debits in his accounts for April 1897 as an instance in point:—

# Irrigation Major Works.

							Re.
Works.			,		•		44
Establishm				•			4,947
Percentage	of	establ	iabm	ent o	bargee	on	•
Capital	ontla	у .					11,243

This is, however, an extreme instance, but the fact that the rules allow of such debite shows that on some works at least real and unreal figures are mixed up so as to disguise the real quarations.

36. Effect of the accident of situation on financial results.—The following analysis of the working expenses in 1899-1900 in two districts adjoining one another shows better than any general explanation can, how the accident of the classification of the district affects working expen-

District.	Name of Work.	Capital Cost. Lakhs of Rupces.	Cost of Revenue Management plus Indirect Charges.	Total cost of mainte- nance, including Share of Establish- ment.	Total Working Expenses.
Áhmeduagar (Imperial)	Lakh Canal Ojhar Canal Bhatodi Tank	314 314 314 314	Rs. 11,097+1,640 12,035+1,765 5,878+760	Rs. 3,488 8,584 1,565	Re. 16,225 17,374 7,703
•	Total .	105	\$2,665	8,637	41,302
Sholapur (Provincial)	Mhasvad Taak Ekruk Tank Koregaou Tank Ashtı Tauk	204 131 81	4,572+700 3,584+520 . 301+49 1,039+215	7,268 5,898 376 3,055	12,640 9,502 726 4,309
	Total	43	10,980	16,097	27,077

Mr. M. Vis. All the irrigation works in the two districts are given in vessaraya, the nhove table for an impartial comparison. Ahmednagar is classed as an Impartial District and Shoinpur a Provincial 20 Dec. 01.

one, notwithstanding that the irrigation works in the latter are about four times larger than these in the former. The maintenance costs more than revenue management on every maintenance ossis more than revenue maintenance costs more than maintenance on every work in Ahmedingar. The two districts lie side by side, and there are no special characteristics in the works thomselves to account for a difference. Yot the proportion of working expenses to Capital outlay is a littin over \( \frac{1}{2} \) per cent. in Sbolapar and nearly \( 4 \) per cent. in Ahmsdangar. A comparison of the results of the year 1895-86, that is, before the familia, gives very nearly the samo percentages.

37. Percentage of working expenses on gross revenue.— The Government of India, in their annual review, compare the percentage of working expenses on gross revenua in the various provinces. The following figures are, for Major Work only, taken from the review for 1899-1900:—

				Percentage on gross revenue of				
				Cost of Revenue Management only.	Total Working Expenses.			
Bombay, Deccan,	and	Guj	arat	16·0ô	89-20			
,, Sind	,	٠	•	0.30	24.50			
North-West Pro	vinc	es		9.80	91.80			
Funjsb .			•	11-20	80-80			
Madras .				10.90	20.70 .			
Bongal .	•	•	$\cdot$	26.80	77:80			

The above comparison does not show the Bombay works in an unfavourable light. If the working expenses in Bombay nre heavy, the gross revenue carned per acro is nlso high.

38. Working expenses per acrs of irrigated area.—As regards working expenses per acre, the Bombay mte is far and away the highest. The following figures refer to the year 1899-1900:—

,				Major Works only.	Major and Minor Works together.	
Bombay	, Deccar	n, an	d Gujs	arat	3.20	3:30
» North-Y		ovina	es Yes	•	0·50 1·10	0·50 1·10
Punjab			~~	•	1.10	
Modras	•	•	•	•		1.20
	•	•	•	•	0.80	0.70
Bengal	•	•	•		1.90	0.30

The rates of working expenses per acre far 1895-96 (before the famine) do not much differ from these in this table. Comparison as above by the rate per acre irrigated is also erroneous. In n year of excessive rainfall the arm irrigated will ordinarily be small, but the expense of maintenance on ascount of floods and breacher on canals will be heavy. To judge of the efficiency of maintenance, by the east per acre irrigated, in such a year will give n totally wrong idea of the year's operations.

39. Costly revenue management and cheap mainte-nance.—The direct obarges under working expenses came

under two heads (according to Statement I-C of the Annual Irrigation Revenue Report), namely,—(1) \*Revenue Management, (2) Maintenance and Ropairs.

For the purpose of comparison under these heads, two important and self-evident propositions may be laid down, namely:—(1) that the expenses of revenus management should be proportionate to the area irrigated; and (2) that the charges of maintenance should be proportionate to the magnitude of the work which is roughly represented by its Capital cost. by its Capital cost.

Under this test the results for 1898-99 compare as fol-

Province.	Cost of Revenue managsment per acre irri- gated.	Percentage of Maintenance Charges on Cupital Out- lay.
•	٠	
Bombay, Deccan, and Gajarat	1.41	0-68
. Sind	0-15	8.57
North-West Provinces	0.47	2·10
Punjab	0.32	3 00
Madres	0.32	1.82
Bengal	080	2-72

Some of the works in Punjab, Sind, and Madras are very Some of the works in Punjab, Sind, and Madras are very old, being nativa construction, and they have been recently improved by the Government. The capital cost of such works is not correctly represented by the outlay shown in the accounts. The high rate of revenue management in Bombay is partly doe to a comparatively larger proportion of perennial crops. Notwithstandingt hese qualifications, the nhove comparison is very important, as it establishes the fast that the revenue management is most expensive in Bambay, while the maintenance is least so. Bambay, while the maintenance is least so.

The excessive cost of revenue management is accounted for by the system of distrist administration and of book debits for establishment explained in paragraph 35.

Viewed as an ordioary Public Works question, the maintenance charges of any work are usually determined by a percentage on the original cost of the work. Works once constructed have to be maintained, whether or not they are used, in the same way that the repairs to a building are not materially diminished by the building not being occupied. Under this test the above comparison shows that the maintenance charges are really the lowest in Bombay, and do credit to the management. and do credit to the management.

In Madins, a maintenance grant of 2 per ceat, on the original cost is usually allowed for the annual upkeep of the tanks. Such an allowance would be regarded as extravagant in the Leccan.

40. System of water-rate assessments.—There is also considerable variation in the manner in which irrigation revenue is assessed and collected in the various provinces. This is explained in Appendix V, column 7, to which reference muy be made.

In Madras and Sind the water revenue is mostly consolidated with land raysnue, and accordingly the expenses of revenue inmagement are very low in these provinces (paragraph 39) The system followed in Bombay resombles that in the North-West Provinces, but while Bombay has all the disadvantages of that system, the owner's rates and the contribution from land revenue which are added to the regular water-rates in the North-West Provinces are decided to Bambay.

41. The system of accounts and assessments has been designed by the Government of India with special reference to the large irrigation works in the North-West Provinces and elsewhere. The same system is applied to the small and

<sup>&</sup>quot;Government Resolution (Bombay) No. 12 A.I.—19 of 12th January 1893, defines "Revenue Management" to mean "those duties exclusively connected with the revenue on account of irrigation water supplied to cultivators, and by which the collection of revenue in explaised. Such duties include the distribution of water, inspection and messating of crops, setting disputes as to cannot stare between irrigators, graging discharges, receiving and submitting water applications, preparing assessment, papers, etc., but are entirely independent of duties connected with the repairs or general multranee of the work which are required to render the canal efficient to perform its function of earrying the water."

soattered works in Rombay, presumably for the sake of uniformity and administrative convenience. The result is, as here shown, that while the direct useful effects are minimized, the initial cost and subsequent maintenance charges are exaggerated by a system of book debits authorized by tho

42. An enquiry into the details of maintenance charges of irrigation works in Nasik and Ahmednagar in the past will show that they are burdened with book dehits for establishmout although only a small part of the establishment is really maintained for the works. The debits arise from the situation of the works in districts which, for no concern of heirs, are classed as Imporial.

# 5 .- THUE VALUE OF THE WORKS.

43. Growth of Irrigation slow but steady in Bombay.—For reasons connected with the black soil and the absence of demand for canal water for food-grain and other common crops, the growth of irrigation on these works has been slow. Up to 1881-85 the Capital outlay invested in common crops, the growth of irrigation on these works has been slow. Up to 1881-55 the Capital outlay invested in them was 210 lakhs, and the results of that year showed an irrigated area of 30,665 acres and a net revenue of Rs. 55,090. The corresponding figures for 1899-1900 were 263 lakhs, 185536 acres, and the 3,55,665, respectively. Thus, in the course of fiften years, with an inocease in Capital outlay of only 25 per cent the area irrigated has nearly trebled, and there has been a seven-fold increase in net reserve. The increase of revenue and improvement in the revenue. The increase of revonue and improvement in the renumerative character of the works are of slow growth in Bombay, but experience shows that that growth is stoady

44. Value of irrigated crops.—The value of crops por acre irrigated is also shown in Appendix II. The Bombay crops were valued at Rs. 59 per nero in 1899-1900, while the best in the other provinces did not exceed Rs. 38 or 65 per cent, of the Lombay rate.

45. Value of the works if constructed and worked on commercial principles.—The contract charges for designing and constructing similar works in Europe would be from 5 to 10 per cert. on the outlay. In Bombay it should not exceed 12 per cent., including land charges, while on Government works, as explained in Appendix VIII, it is actually about 30 per cent. Under Government, the work is spread over a long term of years, during which a large amount is ullewed to accumulate in the simpe of interest on the nartial expenditure before the works begin to carn. Taking these and other similar circumstances into consideration, the cost of such works, if constructed by a private company or individual or on commercial principles by Government itself, would probably not be more than 76 per cent, of the capital value new charged in the accounts. per cent. of the capital value now charged in the accounts.

As regards maintenance, the private owner would be required to pay for expert advice at zaro intervals, especially in the case of minor tanks and canais. The working charges (of which at present establishment forms about 50 per cent.) would prohably be half, and the sepervision and maintenance more close and efficient.

The private owner would sell the water according to the demand for it, onhampored by nny rigid system of water-rates. He would advertise his supply and use his utmost enduavour to persuade oultivators to utilize all the water in the most profitable way to himself.

An irrigation work in the Deceau cost at present at the rate of about ks. 200 per acre of land actually irrigated (Appendix X). To a private owner and to Government itself, when the present disabilities are removed, the cost would propubly be about Rs. 120 per acre. The average yield per acre with high class cultivation may be estimated at about Rs. 65 in an ordinary year, and Rs. 85 in a famine year. The net profit would probably be Rs. 35 in the former case and Rs. 50 in the latter, or on an average, say, Rs. 40 per annum. If the owner of the irrigation work also ewood the land the net return to him would be from nlso owned the land, the net return to him would be from 20 to 40 per cent. on the capital invested.

The private owner would sell the water to the crop which pays him best. He would not reserve the water-supply for the protection of dry crops belonging to other people if his object was to carn a large return. The present peopreturns on the works are dus, among other causes, to the practice of assessing water revenue without reference to local conditions. The Executive Engineer is required to the described his lands and causes up to a cortain standard of efficiency, and whon he has done this the water may run to waste or remain locked up in the tanks for all he cares. There is no co-operation between the supplier and the purchaser. The cultivator is not bound to take the water nor the Government to give it, and in assessing water revenue, Mr. M Vis-no account is taken of the character of the season or the verturaya, market prices of the crops.

The above is a hypothetical case intended merely to 20 Dec. 01. illustrate the true value of an irrigation work. It is not of course recommended that the construction or maintenance should to my large extent be outrusted to private agencies. The Illustration is put forward to show that the tanks and causes are not constructed or worked on a com-mercial basis that the results shoold be judged too strictly on commercial principles.

46. Among other advantages of irrigation works may be mentioned the following:—

Direct and indirect benefits from irrigation .- Irrigntion works are most useful during construction as famine relief works on account of the useful employment they provide to large bedies of relief workers.

In a year of great scarcity, dry crops under command of an irrigation work are protected to the utmost capacity of the work, while unwatered lands in the neighbourhood would lie absolutely unproductive.

In good years, perennial and other valuable crops can be grown, which add to the wealth of the country. In times of varefry people can add back on the surplus of good

Loss of land revonne on the irrigable area is averted in a

No other improvement is so effective as irrigation, in an agricultural country, for keeping the oultivator to bis village and for preventing dismemberment of families and village communities on whose prosperity the regularity of the receipts on account of land revenue depends.

Irrigation works materially reduce the numbers flucking for Government aid on the appearance of a famine.

Fodder is grown for cattle and a water famine is of rare occurrence in the neighbourhood of an irrigation work.

The growth of food crops in a famine year is the irrigated areas helps to keep down prices and is indirectly of service to the neighbourhood and the whole country.

These and other advantages do not admit of direct money valuation, but they are not on that account to be ignored in criticising the value of the works to the State.

# 6 .- CONCLUSION AND RECOMMENDATIONS.

47. Most of the conclusions in this memorandum were derived by a study of the results of irrigation works before the famine. Tables were originally prepared for 1895-96. The results of 1899-1900 are marked by a large increase in the area irrigated and gross revenue everywhere, more especially in the Punjáb, North-West Provinces, and Sind, but there is no appreciable variation in the relative value of the results as affecting this enquiry.

45. The principal object of this memorandum, as already explained, is to bring into prominence the distinctive features of Bombay irrigation, so that if their existence is considered as calablished, the necessary changes in the rules and in the treatment of the works, in consonance with local and in the treatment of the works, in consonance with local conditions, may be made with a view to improve the reverence and thereby pave the way for further extension of the works. In point of financial results, Sind stands at the head of the Provincial systems or nearly so. As Sind works are officered from the same staff of Public Works Department Engineers as those of the Descan and Gujardt, it may be concluded that the comparative ill-success of the latter is not due to any lack of efficiency in the administration.

49. As was observed already, the conditions of irrigation in Sind and Punjab are very different to those in the Dec-can and Gujarat. Cultivation over large areas is imposalble in the furmer without artificial irrigation.

slble in the former without artificial irrigation.

Madras and Bembay (Deccan and Gujarat) fall under a different category. There is no great difference between the two provinces in respect of well irrigation. The percentage which the area under well irrigation bore to the total cropped area during 1899-1900 was 4.89 in Madras and 2.40 in Bombay. But in regard to canal and tank irrigation, while the percentage for Madras was roughly 19½, that for Bombay was about \$\frac{1}{2}\$ only. This great inequality is accounted for by the great demand for rice cultivation in Madras. Excluding rice, this were for Madras in 1898-1899 was 2025/10 hores under for Bombay 96,406 hores. The former, being less than two and three-querter times the latter, will appear small and even unsatisfactory when it is remembered that the relative capital outlay is more than three times, capital outlay is more than three times,

Mr. M. Tise resvaraya.

The chief reson for the inequality is the difference in sail and climate and the absence of deltaic areas in Bombay for the sultivation of rice.

50. In all provinces any large extension of irrigation is dependent on the damend for water for faod-grain crops, namely, cereals and pulsee. As a general extension of irrigation to cereals and pulsee is rendered impossible by peculiarities of soil and climate, sugarcane, and other high class crops might be oncouraged in the Deccan by a system of rulee and management specially odapted for their development.

51. It was remarked before that whils the financial results are judged in a commercial sease, the works are not administered on a commercial basis. To begin with, most of the works owe their origin to famines. They are commenced without sufficient preparation at a time of pressure. When the famine is over, either the works are kept on for a subsequent famine or completed slowly os famids allow. In the meantime, the partial outlay remains unproductive and an account of interest charges is maintained. During 1899-1900, repaire to irrigation canals and tanke were undertaken to provide work for famine labour, and in come cases the outlay incurred was heavy. The returne for the year on such works were in consequence unsatisfactory. We have seen that in come cases dehite are made for establishment not really omployed on, or required for, the works. During famine years, water is given for protecting drycreps as on the Nira Canal by withdrawing the same from high class are and, therefore, in the sacrifice of canal revenue. While both during construction and maintenance the works anheered in this way a variety of purposes of public policy and civil administration, Government should be content with a lower rate of return for the capital than the strictly commercial one. Either the financial results should not he taken as a test of success, or the works should he managed on a strictly commercial basis.

52. It most be admitted that the Bombay irrigation works will never make a neark as Productive Public Works. No large outlay on the scale of Sind or Punjah is justifiable here. The capital outlay per zero actually irrigated is about Rs. 200, the overage value of the produce will be about Rs. 70, and the grees revenue, easy, 34th of the produce or Rs. 6.5. The working expenses amount to about Rs. 3, leaving a net revenue of Rs. 35 and a net return of about 1½ per cent. on the capital outlay. If menaged with due regard to local conditions, the works can be made to pay over 2 per cent., and if constructed and managed on strictly commercial lines more than 3 per cent. The indirect advantages to the State do not admit of valuation, but there is no doubt that the State picks up in a variety of ways the full productive value of the entlay.

Successive Famine Commissions have urged the extension of irrigation works as a protective measure. During the quinquential period ending 31st March 1891, the innual outlay on now works was 5 to 10 lakis. This was reduced to one and a half lakis in 1895-96, and to less than one laki in the following year. The enbequent expenditure does not count, as it was ell, or nearly all, for famine relief.

An annual outlay of from 6 to ten lakes, or about 2 per cent. on the land revenue of the Presidency, would be a reasonable provision in this respect. This outlay would be little more than the interest on the expenditure incurred in the famine of the past two years. It would be necessary to lay down a definite policy in this respect for, say, ton years at a time.

63. Irrigation works in this Presidency have a limited protective value. The tanks on the plains de not generally fill in a year of dreaght. When the ruinfall is good, the crope are good also, and there is no demend for water except for a limited clase of crops. The Nira Casal is developing into an ideal protective work, because the storage reservoir has a ghat catchment, the cupply from which never fails. The canal supplies a tract where the rainfall fails frequently and is almost always defective. Areas in other parts of the Decean which lend themselves to the construction of such worke should receive the first consideration. The experience of the writer on the Nira Canal is that, if managed with an eye to revenue, the work can be made to give a return of over three per cent. Onring 1900, the cultivators were consulted as to their willingness to hind themselves to take water for selected areas for fixed periads of 5 or 6 years. There was a very ready response. Applications were received for about 18,000 notes in the upper half of the canal. They were willing to pay Rs. 10 per acre, and to bind themselves not to grow sugarcane or other orops, requiring a supply in the het

weather, except on a fraction of the area. At present, the productive value of the work is marred by the exigeucies of protection in seasons of drought, and water cannot be given entirely for crops which pay the highest water-rate and for which there is demand.

54. A "Productive Work" is also largely "Protestive." If n work is managed so as to get the heat return from it every year, not meraly us a reserve for the protection of ordinary crops in seasons of drought, the wealth produced in normal seasons will belp to mitigate distress in times of searcity.

## Practical Recommendations.

55. A number of recommendations and suggestions will now be submitted us a logical sequence to the foregoing enquiry to indicate in what directions improvements are necessary and possible. One of the objects in putting these forward is to reconcile the protective with the remunerative character of the works. The suggestions themselves are doubtless expuble of considerable modification and development when the difficulties and objections likely to be raised are met, and the expert knowledge of Revenue and Account officers is brought to bear on them.

(1) It would seem desirable to lay down n definito pelicy to be followed without heetation for n period of, say, ten years at n time, and to decids on a meximum average expenditure of Rs. 8 to 10 lakhs annuelly on irrigation works in the Docean and Gujarat. A larger sum than this may he spent on works, if any euch nro found, on which the outlar is directly productive. There should be no sudden changes of policy.

ba no sudden changes of policy.

(2) If Government decide upon further extension of irrigation works and u liboral expenditute of money on the scale suggested, an officer of the rank of Executive Engineer, let grade, or of Superintending Engineer may be attached to the Scoretariat. Ho will work as a personal assistant to the Chief Engineer, collect technical information for Government, investigate projects, which progress and maintain a continuity of policy both as regards construction and maintenance. Such an officer would be very usoful, especially if he looks upon himself as a helper and adviser rather than as a critic of Superintending and Executive Engineers, and he is not burdened with heavy office Work.

(5) The coestruction of small village tanke and river weirs may be encoeraged, and an expenditare of Rs. 2 to 3 lakks from Provheial Fands set apart annually for the purpose. Small tanks will store water in flood time and give out during a break. They will maintain the subsoil water at a high level in the neighbourheod. Well irrigation might be encouraged in combination with small tanks. Where cook would fait without the other, the two together might be mutually helpful and justify the outlay. (This suggestion is, however, cetside the scope of this enquiry as it relates to works for which Capital Accounts are not kept.)

(4) On lang canals it is not usually possible to supply water throughout the year for percanal irrigation towards the tail. On the Mutha Canal, for instance, water is given for engarane and other perennial crops dependent on wells in the lower reaches during the monsoon only, in the middle reaches for eight months, and in the upper reaches where they are not so dependent throughout the year. In a similar way well irrigation may be systematically encouraged in such lecalities to the mutual benefit of the cultivators and of canal revenue.

(5) There is a number of small tanks costing Rs. 2 lakhs or less included under "Minor Works and Navigation" in the Bombay list, which might be handed over to the Civil Department for maintenauce. The capital outlay on them may be written off against the Surphue Imperial Irrigation Rovennes. Such small works are not maintained by the Public Works Department in other provinces even as Provincial Works. Important repairs might be carried out by the Public Works Department staff, as is at present done on the second clees irrigation works in Khandesh, Nasik, and elsewhere. An arrangement may also be made for a periodical inspection and roport on these works by an expert to onsure that nothing very wrong in the manegement is allowed to occur.

(6) Large tooks should be constructed, as far as possible, in preference to small ones where a olioioe exists, and preforence should be given to streame having ghat catchments. In the case of small tanks (Capital Account Works also), the exervation of wells below them should be encouraged to make the two mutually helpful.

- (7) Levels may be taken, and a careful survey made of (7) Levels may be taken, and a careful survey made of the various districts to see if any very large schemes are passible. An ideal protective work would be our comprising a storage reservoir with a ghat catchment and unfailing rainfall, and a long canal or canals like, the Nira which will carry to supply to plains where the rainfall is scanty and uncertain. The country should be surveyed to see where such schemes are passible, and the most feasible and profitable of these taken in hand first. Sach canals hard a sheave affarding protection to the monsoon craps besides always afferding protection to the monsoon craps irrigate a large area of rabi secording to the supply stored.
- (8) Very large canals may be taken from rivors with ghat catchments to the arid pleins in Shelapur, Ragar, and Bijapur and other districts where possible. Such canals may fill depressions and small tanks along their course, and irrigation may be practised from small tanks, pools, etc., instead of direct from the canal. Irrigation direct from the canal by inandation might also be attempted. In a broken country cross drainage would be costly, but all small makes might be intercepted with enitable eventless weirs. Such canals may be used in a sense as able overflow weirs. Such canals may be used in a sense as inundation canals. They will distribute moisture over a large area in a season of drought and will help well irrigation as well.

(B) At present, only about a third part of the area classed as annually irrigable, is actually irrigated in ordiarry years. The works have been constructed at much expense, but the cultivator is not bound to use the water, expense, but the cultivator is not bound to use the water, oven though his land may benefit by it. In a year of ecarcity, Government may not be willing to give water for perennial cropy. This uncertainty and want of touch between demand and supply has a large moral effect in retarding development. It is astonishing how carefully water is utilised on second class irrigation works in Nasik and Khandesh whare a consolidated rate is levied. The water-supply on many of those warks is precarious, but as the cultivators are obliged to pay for a fixed area, whether or not it is watered, they are careful to take the atmost advantage of the supply available. As it is found that the same area cannot profitably grow perennial or other valueable crops in successive years, they have adopted a system of crop rotation, according to local circumstances, by changing the crops and the intervals at which they are shawn.

The old works furnish an analogy as to what might be done with advantage on the new works. The future success of the latter depends on some each arrangement as the following :-

- In a number of villages under command ucarest the head works from \$ to \$ of the total culturable area might he classed as a that or irrigated area, and a fixed water-rate put an it for a term of, say, six years. This area will bave the first claim on the water-supply during that period. The tatal extent of this fixed irri-gation should be, say, about one-third the area that the tank or canal can permanently irrigate.
- The remeining water-supply should be ased in ordinary years for growing high class crops and doring years of scarcity or famina for the protection of dry-crops. There will thus be three classes of irrigation, namely,—(1) the fixed, (2) the permissible, and (3) the dry-crop. The rate for permissible irrigation should be a self-similar low to cover the loss covering and her the rate for permission triggetor should be sufficiently low to cover the loss occasioned by the interruption of high class cultivation and the divorsion of water-supply for the use of the dry crops when the accurrence of a drought renders it necessary.
- This arrangement will ensure about two thirds of the water-supply being made available for perennial or other valuable crops in all ordinary years, and the same quantity for food-crops in a year of scarcity.
- In the second division, the area of permissible irrigation, the cultivators should be encouraged to construct walls (by takavi advances if necessary) to supplement the canal supply at times of deficiency, or to fall back upon when the canal supply is stopped or diverted to save the dry crops. The precise of supplementing the good supply from wells is one largely followed on irrigation works in all parts of India with most eucoaraging results.

In those years in which the water-supply is diverted Mr. M. Vie-for food-crops, the water-rate on the permissible Mr. M. Vie-nrea should be partially remitted seconding to ofreumstances.

- Where no hardship is liable to be caused, the assessment on dry-crops irrigated should, as far as possible, be on a full area of the field, so that no measurements may be necessary.
- In order that the majority of the cultivators of a village might participate in "fixed" irrigation, an arrangement might become to by which the irrigable land is shared by nearly all the people of a village by the lease of plots for the period for which the area is classed as irrigable. The ners may be fixed after the cultivators come to an understanding among themselves in this respect. Government will forego the liberty of raising the water-rates at pleasure, but the possible loss of revenue will be very small com-pared with the improved receipts arising from fixity of irrigation.
- The works under this arrangement will be protective in a year of scarcity and pradnetive in all ordi-nary years. It will also lead to the concen-tration of irrigation and saving is expense on distributary channels.
- (10) The crop rate assessment with its attendant formalities is a combrous and costly process for small works especially. It should be gradually changed into a consolidated rate on as many works as possible. Under the smaller works, areas which can be conveniently irrigated overy gent may be classed as permanent bajuyat and a fixed canal water-rate levice on them for a period of, say, ten years at a time. Rules for the equitable distribution of water under all the varying conditions of supply might be leid them for the equitable of the prior of the same of the prior of the same of the prior of the be laid down for the guidance of the villago Paach. A epecial officer may give advice and control such cases. The consolidated revenue will tend to greater permanency of irrigation and will save a large amount of unprofitable work to the Public Works Department.
- (11) If the annual returns are to represent the actual transactions and to be a guide to future improvement, such arbitrary debits as these describe in paragraphs 35 and 36 ought to be impassible. The account rules may work very well on large irrigation systems where, owing to the ranguitude of the revenue operations, the burden of establishment is not folt. The Bombay works are so small and the revenue aperations on such a limited scala that even the pay of the subordinate in charge often counts. If the same official is on a work for a long time, the revenue diamnishes as he receives promotion and his salary increases. The remady lies is a new grouping of works and in a re-adjustment of the establishment employed eccording to actual requirements. The Executive Divisions are created for civil works and servo a variety of administrative purposes and, bearing this in mind, each work and service should be debited with a praportionate share of the cost of establishment according to the service rendered. It the charges are in any year excessive, no single work or service should be made the scape-goat. The excess should be debited to, or distributed over, all the warks and services. In that case, the evil will soon be cleared itself and find its own remedy.
- (12) In the case of the emailer works, only the dams and masory works of exceptional importance shoold be in charge of the Public Works Department. The channels should be left to be maintained by the cultivators under the supervision and guarantee of the Revenae Department. Such repairs as cannot be effected by the caltivators themselves, should be attended to periodically by the Public Works Department, as on the second class irrigation works at present.
- (13) For improved administration, a number of works, say, 15 or 20, should be formed into one group on which trained minor officials could be interchanged.

The subordinates of the Public Works Department chould be offered higher rates of travelling allowance in view of the difficulties of travelling in tracts imperfectly supplied with communications. This will also act as an inducement to them to remain on and take an interest in irrigation works.

(14) Irrigation projects should be prepared after a systematic examination, along their whole course of the nalas or rivers where such works would be useful. In the past, projects have received attention chiefly an the occurrence

Mr. M. Vis. of a famine or aente distress. If Government are prerescaraya. viously prepared, it will obvinte the rick of their committing themselves to unsound or imperfectly prepared projects 20 Dec. 01. which bring discredit on the whole system.

(15) A thorough inspection should be made of every irrigation work at fixed intervals of 6 to 9 years and a short report published with the proposed triennial Irrigation Revenne Report at such intervals. A knowledge of the history, defects and wants of a work, which such a report would furnish, will add greatly to the efficiency of maintenance. Such information can only be collected at present hy leborious search into old records which few officers have the time or opportunity to make. Unless a work is thus periodically examined and a programmo of treatment laid down, annual repairs, such as silt clearance and maintsnance of drainage works tending to the permanent efficiency of the works, are liable to be neglected and the establishment will be tempted to seek cheap credit for economy by miximising or postponing such repairs.

56. The system of design and management of irrigation works still followed is essentially on the lines projected more than 15 years ago when the office of the Chief Engioeer for Irrigation was sholished, and the strength of the special staff reduced. Enough is now known of the result of that system and the conditions under which only irrigation can be practised with any degree of success in the Decean. The sanguine expectations in regard to functional results originally entertained have not been realized. The time is now ripe for a study of the ficancial and other results on these works, with a view to determine the precise limits within which further oxtension is desirable and to arrive at a definite policy to be followed in regard to them in the future. It might then he decided how many and what classes of works started in the recent famine should he taken in hand and in what order and at what rate of progress they are to be carried to completion. There is a very large area in the Decean where the rainfall is uncertain and distress frequent to which the protection which irrigetion works can give would come as a great hoon.

17.61

# APPENDIX I.

Agricultural Statistics showing the extent of Cultivation and Irrigation in the several Provinces. .[Norg.-The figures for area and population are according to the Consus of 1891. The areas in columns 6 to 11 :

					Ag panser	ne Director (	General of	Statistics, 190	to 11 are t	issued by the Director General of Statistics, 1901.]	e Agricultur	al Statistics	of British In	din
Frorince.	Area.	Population.	Density	Not area of cropped in		AEEA IN	Agres irri Fr	AGEA IN AGRES INDIOATED DURING 1899-1900 FROM	NG 1899-190	0	Percentage of area of	D. 10		
	Squaro miles.	<del></del>	Population per square milo,		Government Canals.	Private Canals.	Tanks.	Wolls.	Other sources.	Total,	Tank and Consi Trigation, columns 6 to 8, on total cropped		of Ferentingo of total irrigated . area. column 11, on total cropped	Bemanes.
1	eı	ю.	-4	12	9	1					column 5.		column 5.	
Bombay, Decean and							65	6	10	=	13	Ħ	14	15
Bombay Sind	47,215	18.2	*207 60	19,278,203 2,781,014	99,829	6,013 140,693	30,443	657,789	78,149		0.70	0F-8	4.62	Donnite in
Total, Bombay	125,144	18.90	151					00041	110,414	2,641, 147	89.65	1.50	95.09	Gujarat 286 Decan 165 Karnetal 200
,					:	:	:	;	:	:	:	:	ì	000
and Ondh Frorinces Punjab Madras Bengal O ther Provinces All India	107,503 110,667 141,189 151,543 	46·91 20·87 35·63 71·35 	436 189 252 471 	33,026,912 12,976,798 23,123,216 53,263,600 	1,081,373 4,243,524 2,648,160 754,577 	6,692 2 823,729 26,289 1  1,310,723 4,	2,182,077 20,049 1,532,627  4,388,375	6,121,685 4,154,598 1,129,804 	634,048 10,934,871 134,083 9,375,985 148,086 6,783,766 755,577	634,048 10,934,875 134,053 9,376,283 146,086 5,783,766 755,577 755,577	12.66 39.29 19.49 1.40	18·54 22·03 4 89 	,33·11 72·25 25·01 1·40 	

APPENDIX II.

BEFERRICE:-Government of India Review of Irrgation Works, No. 839-C W. I., dated the 26th July 1991. Irrigation Revenue Reports for 1898-99 of the various Provinces. Comparative Statement of Land Reconne, Irrigated Area, Value of Irrigated Crops, &c. (All India.)

	Renibra.	13			•							•
Incas,	Estimated value of Crops por Re, 100 of Capital Ontlay (Major Works only), columns 5 and 6.	ន	Rs.	30	103	69	109	173	76	. 41	i	101
10 Varions Prov	Aron irrigated per Re. 190 of Capital Ontlay columns 4 and 9, 1899-1900.	111 .		0.33	7.25	3.46	3.17	5.13	. 4.03	1:12		
tor 1898-99 of t	Portoningo of uros in column 9 on ares in column 9 or ares in column 8.	10		83	06	81	93	66	8	649		:
Attiguate typyonia traports for 1898-99 of the various Provinces.	Area nothally irrigated by Works for Capital Capital Accounts are kopt, 1899-1900.	c	Aores.	105,820	1,572,457	1,678,286	278'08'5	4,957,89.1	3,286,344	727,026	411,261	13,921,756
	Area ortimated as irrigablo by the Works Capital Capital Reconsts are econits are econits are econits are econits are econits.	60	Acres.	316,125	1,746,900	2,063,326	3,076,000	6,026,390	3,316,632	1,485,150	:	i
the state and the state of the	Average value of Crops nor Acre (Major Varks only), 1899-1900,	7	Rs.	28.4	25.50	25-3	36.0	37-4	7.01	24.7	:	31.6
The market for the	Estimated value of Irrigated Crops mader Capital Account Works (Major Works 1899-1900.	ဗ	Million Rx.	0F.	1.81	16-6	62.G	16 39	3:38	2.52	:	36 02
on the formal to	Capital Ontlay on Irrigation (Major Works 1899-1990.	ເກ	Million Rx.	1.90	1.78	3.74	8.73	.g.,	7-20	6.16	120	35.5\$
	Capital Outlay on Irrigation Works for when Capital Acconsts are kopt. 1899-1900.	ą.	Million Rz.	5.68	3.17	4.85	10 6	29 6	8.16	6.53	1 02	38.97
	Land Royonno, 1893-99,	£	Million Rx.	Not available.	Do.	£6.4°	79.0	2:27	202	7 02	57.7	97.48
	Total Revena as shown in Financial Accounts, 1893-99.	eı	Million Rx.	Not arail-	Do.	14.80	12.61	9.30	14:29	20.63	20.84	101:43
	Province.			Bombay, Decean and Gujarat .	. Bombay, Sind	Toint, Bombay .	North-West Provinces and Oadh.	Panjab	Mudras	Bengal	Other Provinces	All India

APPENDIX III.

Irrigation Works for which Capital and Recessue Accounts are kept (All India). Rexxnence:-Government of India Roriew for 1899-1909 of the Navana and Expenditure on Irrigation Works in India.

		[					,			•
	Remars.	14								
WORES.	Rato of assessed Revenuo por acre.	13.	3.6	çı Çı	13	7:0	ζ, 80 ,	•	:	က်
190-1900.	Percentage of working expenses on gross Revenue.	13	39.2	24.5	31.8	31.3	4-03	76.9	:	:
Major Works, 1899-1900.	Cost of working per acro.	, 11	3.6	. 0.5	1.1	ដ	6.0	, G. T. O.	:	:
MAJOT	Rate of nascreed Rovenuo per a 120.	10	9.9	. 1.9	ဗို	S	4.0	1.9	:	9 4
CRES.	Total.	G	105,829	1,573,467	2,830,945	4,957,894	3,286,344	727,026	192,139	13,921,756
м 1699-1900, А	Minar Works.	8	38,602	764,317	177,451	672,033	517,676	.ViV.	411,261	3,087,455
ARRA IBRICATED IN 1895-1900, ACRES.	Pretectivo Worke,	2	40,857	Nil.	86,622	158,106	164 18	Niz.	:	317,379
	Productive Works,	ຍ	28,370	808,140	2,616,872	4,326,866	2,686,874	727,026	į	10,601,233
овкв.	Total.	r9	40	15	10	13	***	4	<b>6</b> 0	124
TOATION W	Minor Works.	바	22	£~	4	L3	26	н	t-	78
Kourer of Irrioation Works.	Protective.	ຕ	•	Nil.	H	н	H	į	:	G
Nax	Productive, Protoctive.	e1		φ	ı,	4	œ	ęs	<b>.</b>	88
•	Province.	1	Bombay, Decean and Gujant	" Sind "	North-West Provinces and Ough.	Punjab	Madras	Bengal	Other Provinces	All India

APPENDIX 1V

IRRIGATION WORKS FOR WRICH CAPITAL AND BEVENUE ACCOUNTS ARE KELT.

Comparison of Pinancial Results for the year 1890-1990.

	CAPIT	CANITAL OUTLAT TO END OF THEOGRAND RS.	. Exp or 1899-1200. d Rs.		Gread (Triga-	Working	Not Revenue	Percentage of net Revenue on	Percentago of net Reyonne on	Percentago of net Bevenue ou	Percentago Percentage of net of net Revenue ou Revenue on	Forcentago of act Revenue on	9-
Fritaes.	Productiva Works,	Pretactive Works.	Vinor Worki.		tı in Rerengo).	Espenage.	on all Works.	Capital Out- lay, Produc- tive Works	Captel One-Captel Out-Captel Oxt-total Capital Iny. Prodec-lay, Protec-lay. Moure. Ording, all try Vorks. Works. Works.	Capital Onf- lay. Muor Vorks.	total Capital Outlay, all Works.	Murk, for 1835-96.	Remares.
1	e1	60	-	100	9	7	œ	6	OT	11	13	13	14
	-				i.	ž	컕						
Bombay, Detean and Gujarat .	10.978	8,631	2.174	26783	7,25,581	3,51.611	3,70,920	146	1-14	ş	134	1.3	
Bombay, Sind	12221	Nil.	3,976	21,730	26.07.531	7,55,53\$	18,81,707	6-51	:	18-23	. 8.7	6-7	
Total, Bombry	26,752	8,631	11,150	48,533	33,23,105	11,40,178	22,52,627	4.93	1-13	654	4.6	83.	
													-
North-West Provinces and Ondh	82,837	4,371	2,913	111,00	176,11,071	31,01,013	61,67,059	ויי	i	16 2	61.2	3:5	
Funjab	\$7:200	.1,130	2.236	189'96	1,18,16,150	52,77,676	102,89,50	<b>18.6</b>	19.6	13 69	66	5.6	
Madras	67,288	4,716	9,537	81,571	19711768 .	22,11,773	119,20,00	818	ģ	10	7.1	7.10	
Bengal	61,639	. N	. 707	62,316	17,70,900	13,62,275	4,18,625	89.	:	é	.67	0.3	
Other Provinces	2,693	311.	7,817	10,199	9,35, 135	6,17,203	3,18,230	:	:	15 97	30	143	
All Jedia	333,526	21,831	31,310	389,777	3,88,51,878	1,38,21,310	2,50,27,559	6.77	<b>F</b> .67	2.28	4.9	4.3	
,													

# MINUTES OF EVIDENCE.

# APPENDIX V.

Statement showing physical conditions, local psculiarities of Irrigation and sources of Irrigation Revenus, etc., in the various Provinces.

Mr. M. Visvesvarayo.

20 Dec. 01.

No.	Province.	Donsity of popula- tion per square mile.	irrigated arous.	Source of Water-supply.	Local peonitarities of Cultivation and Irrigation.	Sources of Irrigation Bevenue and manner of Assessment.
1	5	3	4	5	6	7
1	Bombay, Dec- can and Gujarat.	207	20 to 26	The water-supply is from tanks and small rivers or from a combination of hoth. The rivers not being recently practised from them without the sid of storage reservoirs.	The country is runged and broken. There being no perendial streams in tracts suited for irrigation, large canal systems, soch as are found in Northern India, are not presible. The works most necessarily be small and scattered.  Irrigation in Bombay is not carried on by the diversion of snow-fod or spring-fed rivers as in Northern or Southern India. Except on some minor streams water has to be collected in costly tanks and taken in canals which run over broken country requiring expensive cross drainage works.  The black soil which prependerates in the Decem passesses the pecularity of resisting evaporations and is unsuited for the irrigation of crops ordinarily grown by rainfall.	aro not enpplomented by "Owner's "rates as in the North-West Provinces, nor by a sharo of land rovonno.
C)	Sind (Dombay)	,	Below 5 Inchos.	Irrigation is chiefly by inundation canals from the Indus. The supply in the river though abundant in all seasons is apocally large in the khariftseason when the Indus floods rise to a sufficient height to command a large tract of country.	Chittvation without artificial irriga- tion is practically unnexistent in Sind. The annual inusulation brings in a lot of silt which fertil- ires the seil.  Till recently irrigation was largely dependent on the character of the inaudation in each year. The works now in progress ore intend-	canal consists al- most entirely of share of land rov- cane which is divided in the ratio of 90 per cent. to irrigation and 10 per cent. to
3	North-Wood	406	21 ta 40		other principal crops which benefit by irrigation are grown during the cold season when the rivers are at their lowest.  There are only five major works in the North-West Provinces, the largest of them being the Ganges canal completed in 1854. Though fine in number the canal systems are very large and continuous.  The country has a gradual slope of from a foot to 18 inches per mile. In favourable seasons food crops can be raised without the aid of artificial irrigation is available artificial irrigation is available.	ansosacd partly on the occupior and partly on the owner of the land, the bulk of the rates feding on the former. The receipts are further increased by a not unimperiant coatri bation from land revenue.
4	Panjab .	180	13 to 17	The rainfull is ordinarily insufficient for cultivation, and irrigation is either from percunial rivers like the Jumna or from innutation canals (as in Find) from the river Indus and its tributation,	south are simillar to these in Sind; in goods! Punjab resembles the North-West Provinces with which it is contiguous.	rate assessment i
	Madras ,		25 to 50	Irrigation is earried on a large scale on the river deltas where the mater-amply is percaniel; nice by a large number of tanks, mosting of old untive another them.	is mainly one of rice entitation. Over \$0 per cent, of the Irrigated crops is rice. On most systems only one crep is raised in a year and this is irrigated in the miny season when the rivers are in flood. Irrigation works are of great importance here as they are also used by necessary for secoring a barves of rice in all years, specially good harvests. In the delitals areas the use of water begins in the immediate vicinity of the dam or weir. Comparatively simple works are sufficient for irrigation. The difference of level between the river and the country is to light that a modernate height of dam suffices to lift the	gation rorenne is evilenced, and or most of the work is consolidated with the land rovenue.
G	Pengai .	471	49 tn 50	Irrigation is from per- ennial rivers like the Mahanadi and the Stue,	water into the irrigation channels. The Gauges delta is very favourable for irrigation, but the rainfali	System of assessment and a series of assessment Bomlar (De can and Quincat).

## APPENDIX VI.

Note on the classification of Irrigation Works for fur-

Reference:-Government of India Resolution No. 177 -I., dated 26th July 1892.

For purposes of account, irrigotion works are divided into two main classes; Major and Minor.

Major works again are sobdivided into-

- (a) Productive works, which torm is applied to projects that are estimated within ten years after completion to yield a return of at least 4 per cent. on the sum-at-charge, i.e., the direct and indirect Capital outlay plus the accumulated arrears of sin'ple interest.
- (b) Protective works which do not necessarily fulfit the above condition, but nro undertoken in order to protect certain tracts fram famino.

Miner works of irrigation are again subdivided into-

- (a) Those for which Capital and Revenue Accounts are kept.
- (b) Those for which only Revenue Accounts are kept.
   (c) Those for which neither Copital nor Revenue Ассорть вто керт.

Agricultural works, which term is applied chiefly to river embankments, are included among Minor works and are subdivided in the same manner.

2. Funds for Capital outlay on Major works are at Pra-sent provided in all cases from Imperial resources.

In the case of Productive works, the capital outlof is principally from borrowed money. This is supplemented by grants from Imperial reconness out of the sam set saide annually for famine Protection and Insurance. The Recense outlay on these works is also imperial, except in Beugal and the North-West Provinces, where it is Provinced.

For Protective works the capital entity also comes out of the provision for famine Protection and Insurance, the charges on the Revenue Account heing also Imperial.

In the case of Minor works, the Capital outlay is from Imperiol Revenues in Rajputana, Baluchistan Upper Burns, Bombay (except the Gokak Storage Works) and the Pupjab. In Lower Burns, Bengal, the North-West Provinces, and Madras it is Provincial. The Revenue untilny follows the same division. samo division.

3. Receipts on Revenue Account are of two kinds-Direct and Indirect.

Direct recoipts consist principally of the occupier's or water-rate levied on irrigated lands and of the number's rates on the rome land, the assessments being made as a rule by the Public Works Department, but the recipits realized in the Recease Department. They also include realizations on necount of the sale of water for sondry the receipts for the rate return of the rate of water for sondry for the rate of purposes, for the water-supply of tawer, from plantations and other casal produce and fer water power, navigation receipts, rents of huildings, fines and miscellaneous, which are all realized by the Public Works Department. Direct receipts are oredued to Imperial or Provincial in the same way as the Rorenne onthay is debited. way as the Rorenne ontlay is debited.

Indirect receipts are realized in the Revenue Department and consist of the share of the enhanced land revenue due to and consist of the share of the enhanced land revenue due to irrigotion, or, in other words, a portion of the increased land assessment that is levied on land brought under the command of an irrigation work. In the case of all Major works these receipts are credited to the works in the Finance and levenue Accounts. In some provinces, however, and notably in Madras, the water-rates though separately ossessed ore collected with the land revenue and in the case of those works for which Capital and Revenue Accounts. In the case, however, of all Minor works, no credit is

In the case, however, of all Minor works, no credit is afforded on account of these indirect receipts, which are included in the general land revenue.

Indirect receipts are credited to Imperial in all cases, a proportion of the total lend receipts being assigned as the Provincial above under the contract system.

As regards expenditure, the Finance Accounts show all direct charges for both classes of works, but not the indirect charges on account of capitalization of abatements of land revenue and of leave and pension allowances.

# APPENDIX VII.

Summary of Account Rules in force for regulating Establishment and other charges.

Public Works Department Code, Volume II, Chapter XIV, 2119.—When one fund or one branch of the department oxecutes work for anothor, the charges for Establishment and Tools and Plant will be regulated under the fellowing rules:—

Establishment.—The charge will be colonlated at the rate of 23 per cent. on the author on Works and Repoirs (excluding certain items specified in clause IX of rule) plus 5 per cent. on the revenue realized from Civil or Muhtary Works and 10 per cent. on all direct revenue realized from irrigation Works.

Special Revenue Establishment .- Where a separate Establishment is entertained for the collection and management of Irrigation Revenue, the whole cost of that Establishment will be debited to the fund concerned instead of the 10 per cent. charge referred to in the preceding

Distribution of charges within Provincial and Local Branches of a Province.—When the establishments are Provincial or Local, the Local Government or Administration may apportion the charges for Establishment and Taubannia Pranta between Provincial and Local Civil Works in each apportion as your less considered desirable. in such proportion as may be considered desirable.

2. Public Works Department Code, Volume II. Chapter XIV, 2120.—The establishment charges in the executive divisions of the Irrigation Branch should be apportioned between the several classes of works carried out in thuse divisions under the following rules:—

an energes for Establishment arising in executive divisions in which only Capitol works ore in progress and all charges for Superintending Engineers and their officers employed whally in superintending Capital works will be debited monthly to Capital. (a) All charges for Establishment arising in executivo

Capital.

(b) In divisions where both Capital and Rerenace on they is being incurred, the charge to Capital for Countraction Establishment will be made month by month at 18 per ceut, on the ontay on Works and Repairs, the balance of the charge for Establishment after deducting the sum charged to service heads, other than Irrigation, toing debited monthly to the Revenue Accounts.

(c) In the case of mixed divisions primarily kept up for maintenance purposes, in which—

(1) noting on Capital works;

(2) ontlay on works for which neither Capital not Revenue Accounts are kept;

(3) Revenue outlay on works for which Capital and

(3) Revenue outlay on works for which Capital and Revenue Accounts are kept;

(4) Bercauo ontlay on works for which Revenue Accounts only are kept;

are all in progress, the debit for establishment to the let and 2nd of these classes of works will be in accord-nues with the preceding rule, the balance of the charge after deducting the sum charged to Major heads other than Major Irrigation leads being divided between (i) and (4) in proportion to outlay.

(d) In the case of a mixed division in which the outthe case of a mixed division in which the out-lay on Capital works is so large that it may be fairly considered that the division is kept up primarily for Capital works, the charge to the Revenue Account for establishment will be regulated in accordance with Bules II and III, the bulancoul the charge after dedocting the sum charged to Major heads other than Irriga-tion Mojor heads being debited to Capital.

8. The Government Resolution quoted in the margin Government Resolution No. 283. indicates the noture and A.1.—1803. dated 18th December extent of the spplication of 1836.

the code rules in the twn preceding paragraphs to outlay incurred on Works and Repairs in this Psesidency.

The charge is 23 per cent, divided as under-

Administration (Scoretarist und Accounts) . 21 per cent. Saperintending Engineer . Construction (Executive Engineer and Establishment) 21 12 18 Total 23

The Secretarist is Provincial; so 21 per cent. of the Establishment clarges on Imperial Irrication Works is invariably crodited to Provincial Establishment.

The remaining EO; per reat, is credited to In perial Irrigation Reisslichment if both the division and district are Imperial. If one of these is Provincial and other Imperial, oredits out of 20% per cent, are made to the fault concurred, for the division at 2; and for district at 15 per cent.

- 4. The marginal Government Resolution explains the sirrengent Restent Bo. 12 charges debitable to Reve-2.1,-30, 2003 12th January 1903. muo Account.
- (1) Charge at preceiving rates.—This is a percentage on expendance and provides for the executive and subordinate establishment couplaged on maintenance and repairs.
- (2) Store of subordinate establishment employed on resenue management.—This is on account of the time spent on the duties of resume management by the subordinate c-tablishment.
- (3) Special Receips Establishment.—This is establishment such as measurers, patlatics, etc., specially employed in connection with the revenue management.

- (4) Direction elarger This is either a class of artist 3fe, 2 Viccost or a percentage on expenditure to ever the cost of exercises. Chief or Seperintending Engineer and a percentage charge for Sepretariat and accounts.
- (5) Collection charges.—This is a percentage on the terrome which is ere lited to the Revenue Illepartment and deblied to the work on account of the collection of revcane by Reverue officiale.
- 5. The Goremman: Resolutions noted in the margin A 1.—11. dated the test that the rather of the A 1.—11. dated in Frinary is a collection of resemble that the first of the charges for assessment and a 1.—14. dated in March 1944.

  Receive officials, referred to in clause 5 of the providing paragraph.

The charge for collection only ca 5 per cent. ierigeta n norke is.

For lands watered in Native States. The charge for collection only is. 7 per cent. The same including measurement when the latter is not made by . 10

the Irrigation Department

# APPENDIX VIII.

Indication Wolfs for which Capital and Rytener Accounts are meet.

Nature of charges included in capital outlat.

The following table gives an analysis of the total Capital Outley in the Borrhay Presidency, excluding Sind, to end of 1899-1909.

Item.	Capital Out- lay to one of 1899-1990.	Actual per- centage on direct Unitary on Works.	Percentage on direct Ont- lay on Works under the vules,	Remares.
1	2	3	4	5
I.—Works (direct outlay) II.—Establishment III.—Tools and Plant	R#. 2,04,90,162 46,21,506 4,87,697	100 22.55 2 89	100 23 1:5	
Total .  Deduct on account of receipts on Capital Account	2,56,99,365 36,188	121-93	121.5	
Total, Direct Charges	. 2,55,63,177	124.75	124-5	
Capitalization D.—Indirect Charges.	. 6,02,228	2.89	3*	This is an approxi-
Leave and Pension Allowances	8,17,663	8.99	3.23	mate figure. There is no fixed percentage
Total, Indirect Charges .	14,09,891	6.88	6 22	but it usually varies from 2 to 8 per cent.
Grand Total, A and B	. 2,89,73,063	131.63	130.72	depending on the locality.

# APPENDIX IX.

ICBIGATION WORKS FOR WHICH CAPITAL AND REVENUE ACCOUNTS ARE KEPT. Distribution of Works and Capital Outlay in the three Public Works Divisions of the Bombay Presidency lexcluding Sind).

7. 111 977 3 973 54	Nur	aber of Wo	orks.	(	Capital Outlay.		Percentage of Outlay
Public Works Divisions.	Major.	Minor.	Total.	Major.	Minor.	Total,	in division on total Capital Outlay.
1	2	3	4	5	6	7	8
				Rs.	Rs.	Ra.	
Central Division	7	12	10	1,73,54,467	37,52,673	2,11,07,140	80-18
Southern "	1	14	15	8,61,892	35,55,317	44,20,209	16.79
Northern ,,	1	1	2	5,17,838	2,78,367	7,96,205	3 03
Total, Decem and Gujarat	9	27	36*	1,87,37,197	75,90,357	23,23,554	100.00

Three works under construction and one in abeyance are omitted.

Mr. M. Visvesvaraya. 20 Dec. 01.

Particulars of Irrigation Works in Operation

No	Name of Work.	Year in which Work first	Area at present esti- mated as annually	Area irri	igated during	Estimated	l value of Crop
		came into operation.	irrigable by the Works is column (2), 1899-1900.	1898-99.	1699-1900 (Famine year).	1898-99.	1899-1900
1	2	. 8	4	5	6	7	8 -
	Central Division.		Acres.	Acres.	Acres.	Rs.	Rs.
1	Nira Canal	1885	118,280	4,360	27,200	12,65,777	20,03,09
2 3	Mhasyad Tank Lower Panjhra River Works.	1885-86 1865	24,300 12,627	6,101 3,593	13,656 2,458	1,10,193 73,782	9,94,993
4	Kadwa River Works	1878-79	14,637	2,659	2,520	59,445	,0
5	Lakh Canals	1868	11,280	979	1,053	1	45,612
6	Mutha do	1878	16,800	8,045	8,725	12,310	7,040
7	Ekrnk Tank	1871-72	16,941	3,864	4,994	1,06,503	2,22,527
8 9 0	Hartala do. Mhasva do. Jamda Cavals	1875-76 1877-78 1866	415 1,700 5,000	90 218 2,585	899 4,515	433 3,525 29,484	30 14,945 52,821
2	Parsul Tank Ojhar Canals	1889-90 1874-75	1,000 14,763	550 5,472	172 3,701	0,816 64,462	5,683
3	Bhatodi Tank	1871	12,124	743	870	25,680	17,571
5	Matoba do. Kasurdi do. Shirsuphal do. Bhadairadi do. Koregaon do. Ashti do.	1878-79 1869 1878-79 1881-82	3,250 1,800 2,000 1,050 11,780	2,139 189 1,190 1,808 247 1,816	1,211 **** 400 826 312 6,023	61,020 2,149 88,933 88,578 2,965 10,846	81,241 0 89,050 50,384 2,069 1,50,077
	· Southern Division.						
	Krishna Canal Rewari Canal Upper Man River Works	1869 1866 1872	12,820 1,920 2,080	3,970 1,567 1,570	6,511 162 1,781	5,35,129 94,486 22,979	5,75,485 27,892 54,025
	Yerla River Irrigation	1868	5,480	3,859	4,126	49,567	1,60,040
	Chikhi Canal . Maivi Tank Canal . Muchkundi Tank .	1870 . 1875-76	1,478 4,025 15	468 1,551 4	45 1,998 64	29,769 43,699 120	3,800 45,410 1,087
	Nilgond do. Gadikeri do.	•••	337	, 0	0	0	0
	Dambal do	1879-80	1,000	337 <b>4</b> 171	387 <b>*</b> *) 239	0 11 514	Ó
	Medleri do. Madag do.	1884-85 1865-66	600 1,345	144* 99 . 833	144 <b>°</b> 138 1,814	8,618 41,448	19,827 14,760 74,066
1	Asundi do	1884 .	1,011	130	350		
	Mavinkop do.	1881-82 1884-85	617 7,200	185* 540* 6,455	185 <b>*</b> 540* 8,424	6,349 0 20,156	6,229 0 24,887
	Northern Division,						
	Hathmati Canal Khari Cut	1879-74	8,000 8,000	4,279 2,805	110	1,87, <b>8</b> 60 80,935	1,210 0
	Total .	,,,	316,425	180,849 1,206#	104,624 1,206*	42,40,228	48,15,824

DIX X.

/in Bombay (Deccan and Gujarat).

Mr. M. 3 vesvaraj 20 Dec. i

Capital Outlay to end of	Revonue Outlay to	age of net on Capital and of year, ssessments.	Maximum area irrigated in any one year botween	Acre of maximum	Paris
1899-1900.	1898 99.	1899-1900.	1886 87, or date of epen- ing and 1899-1900.	ted per column (12),	ADDUATE DO
9	10	11	12	18	14
. Rs.					
50,83,300	0.87	1.50	47,574	119	Is comparatively a new work, but most promising, as the experience of the year 1900 1901 has shown.
20,75,411 4,68,616		1 26 1 98	18,656 3,868	152 121	Water stored to full designed height since 1898 only. Storage tank ensures old irrigation. Supply not reliable
7,52,217	194	>40	3,403	221	for extending personnial irrigation to new areas.  Waste weir of Waghad Tank incomplete and water not
3,71,891	•••		1,674	222	stored to full designed height.  Storage works required for high class collination. Black
66,62,646	2.00	3·11	14,031	474	solt unfavourable for extending dry-crop irrigation.  Lake Prie provides the storage for water-supply to Poona City and Cantonment. Rabi irrigation is limited, de- panding on the percunial crop area for which water is required.
13,40,386	0.80	1.52	4,994	268	Canals are single-banked and being frequently silted are expensive to maintain and do not carry their full supply.
73,382 1,38,956	0.87	0 51	249 899	225	Catchment insufficient. Tank does not fill every year.
10,41,069		1.22	5,174	154 201	Tank too large for catchment and available rainfall.  Storage works required for perennial irrigation. There is
2,14.995 3,30,275	0.21		822 6,868	262 48	not much demand for water for rabs or measoes crops: The tank is now and of limited utility. Storage works required; not much demand for water for
3,79,707	1.37		1,720	221	monsoon or rabi crops.  The tank runs dry in or before April as a rule and there is
2,01,422	4.09	4.72	2,883	71	no irrigation till the monsoon begins. Is a promising little work fed by the Matha Canal.
45,690 2,21,568	***	,,,	245 1,753	186 129	Supply small and limited. Unreliable in seasons of
2,27,422 39,189	0.21	0.09	1,895 429	120 V1	drought.
8,36,098	***	ï·12	0,023	139	Dam constructed of bad material and not quite secure.
8,64,892 59,811	3·70 9·26	4·70 1·55	6,564 1,877	182 32	Storago works required and are under consideration. Ontohment small. Storage works required.
4,80,606	0 10	•••	2,022	213	Supply deficient. In a year of drought the Pingli Tank does not fill.
7,04,892	0.62	0.23	4,128	171	The Nehr Tank does not fill in a year of scanty rainfall.
57,442 3,89,649 1,59,707	1·91 0·06	0.73 0.81	628 1,998 205	92 195 774	Work small and of limited utility. Catchment small and rainfall insufficient. The tank never fills owing to restricted catchment and scanty rainfall.
9,027 9,279	i7:67	0 17:91	377	0 25	
63,980	2.09	2:78	440	146	Works small and of limited utility.
81,392 1,67,598	Ö-21	0·07 0·89	145 1,914	501 128	Rainfall good in the nelghbourhood. Not much demand for irrigation.
74,995	4:11	•••	211	855	Works small and of limited utility.
30,847 13,17,002	6·02 2·17	6·60 2·48	546 8,424	56 156	Is a promising work, jet young and undeveloped.
•	-				
5,17,838 2,78,367	0·73 5·67	914 205	5,890 8,126	90 90	Storage works required.
2,63,23,554	1.53	146	1,65,681	169	

Mr. M. Vis. Note on Establishment Charges prepared by Mr. Beale, vesvaraya.

Superintending Engineer on special Duty, for the information of the Irrigation Commission, 1901-20 Dec. 01.

Mr. Visvesyaraya'o momorandum of November 1901, referred to in the Report, contoios a note on the classification of Irrigation Works (Appendix VI) and a onlongry of Account Rules for regulating Establishment and other Chorges (Appendix VII).

The following remarks may be found useful :-

In Government of Indio, Public Works Department Resolution No. 869—C W. I., dated 26th July 1901, the Irrigation in India in 1899-1900 was reviewed. (Republished in the Bombay Government Gazette of 31st July Hehed in the Bombay Government Gazetts of 31st July 1901). In this roviow it was shown that the Mojor Productive Works for all Iudia have been constructed from Loan Funds, and from Revenne in the proportion of cloud 5 to 1, while the other works: Major Protective, and all Minor, ere constructed from Revenne. In Bombay the Minor Works for which only Revenue Accounts are kept are termed 2nd Class Irrigation Works. As regards Minor Works for which noither Capital nor Revenne Accounts ore kept (Agricultural Works) they are apparently of most importance in Modros. It is stated at the sod of paragraph 18 of the revinew: "Important as ere those works in the aggregate it is hardly possible to determine whot shore of the revonue dependent on them is due to the expenditure incourted by Government on their upto the expenditure incurred by Government on their up-keep, and on this account cootinuous Revenue Accounts have not been mointoined."

In Appendix VII of Mr. Visvesvaraya's memorandum, aragraph 3, the following may be substituted for the paragraph 8

A Provincial district carrying out Irrigation Works charges 23 per cent., provided the Superintending Engineer belongs to the Provinsial Establishment. If he belongs to Imperial Establishment (as in the Control Division) the chargo is only 201 per cent.

An Irrigation district carrying out Provincial Works charges only 18 per cent., provided the Superintending Engineer helongs to the Provincial Fatablishment. If he belongs to the Imperial Establishment, the charge is 203

For further details reference may be made to Government Resolution No. 1903, dated 14th December 1894, quoted in the margin.

The Secretary to Government of India, Poblic Works Deportment, No. 98-A. 1. of 17th August 1834, concurred with the views expressed by the Government of Bombay as follows :--

Bombay Government Resolution No. 66-A.1.—229 of 1884, dated 26th May 1884, convoluted two rules—

(1) the costs of all establishments employed primarily

- for purposes of Rovenuo Maintenance should be debited to Revenuo Maintenance;
- (2) concerning division of chorges on other establishment debitable to Rovenue Account:

In Sind (except in a few cases where special establishment has been engaged for Ravenuo Management), the whole Public Works Establishment under Direction and Executive should be debited to Maintenance, as the Department is not concerned with assessment and collection of

Similarly in a few cases in Gujarat and Descan where bimilarly in a few cases in Chiparat and Depean where the Revenue Management still rests with the people, or the Revenue Department. But for new works, 25 per cent, on the cetual outlay should be charged for Establishment on Mointennuse and Repairs and the balance debited to Revenue Management.

The charges for collection by Civil officers are as follows :-

- (1) Works fur which the essessment papers are pre-pured by Public Works officers, but collection is made by Civil officers—5 per cent. on reclizotious.
- (2) Works for which assessments and realizations are made by Civil offisers-10 per cent. on realizations.

The charges for collection by Jagirdars is 7 per cent. if Jegirdars make collections only, and 10 per cent. if measurements for ossessment are also made by them.

Note.—In the case of the Ashti Tank in Shelspur an nllowance is regularly paid in cash to Jegirdars by this Department for collection of the assessment of Public Works officers. The amount collected is therefore, deducted from the total revenue realized when calculating the eollection charges to this project.

Some percentages are quoted in the necompanying statement, celsuloted from the figures given in the "Abstract of Expenditure" on the various classes of works for Bombay, for the year 1899-1900.

The charges ere oil authorized by Public Worke Rules, and where the percentages appear wrong the matter depends apon some detail of expenditure, on which the proportion is different.

The 18 per cent. E-toblishment Charges abown against cach district is the Executive E-tablishment only. Under "Exoniner's Auxiliary Accounts" the 6 per cent. charges are made for S. E., Secretariat and Accounts. Expenditure on land compensation and similar things are crempted from Establishment Charges—vide Pablic Works Code, Velume II, paragraph 2119, Bule IX. When such expenditure is incorred, the percentage figures will be affected.

Sometimes there is a charge for Establishment and no expenditure shown. This is, because Imperial Irrigation Distriots charge 12 per cent. to "Incorporated" and "Excluded" Local Funds and the remaining 11 per cent. to Provincial Civil Works on account of outlay carried out from both Local Funds. This also explains the excess over 18 per cent. in Nasik and Nager. There is also an charge of 5 per cent. on Provincial Revenue in Nagar and and Assik.

### Examples :-

Poona Indication	D16-
45.—Provincial Works.	Civil
	Es.
Repairs	6,926
Deduct ontlay ex-	6,933
	2,066 4,867
Establishment, 18 per cent. Do 6 per	876
cent on exclud- od Local ontlay.	3
	879
vis , 12.67 per cent. on Expenditure,	
()	TRICT.  15.—Provincial Works.  Original Works .  Deduct ontlay exompted  Establishment, 18 per cent. Do 6 par cent. op exclud-od Local ontlay.

Norn.—The charges on Famins Relief Works (imperial) are for the actual establishment exclusives on pass of such work. There is no presentage charge for Superior Establishment and the figure, which rary stom 0.10 ivit, but are more than an account. Statement showing precentings charges for Establishment on the various closses of nork in each district for 1809-1900.

,				PROVINCIAL DISTRICTS.	Tricts.				IMPERIAL IRRIGATION DISTRICTS.	IGATION	pistaicts.	TMPERI	IMPERIAL DISTRICTS,
	Wift Provincial Survisiveded Esternese.	Surentars 1876.	PEIGR	With Investa Structuring Enginese.	Тит Расор	NOTE BOTE	RICKILKIK	Win Propiecie Sorspicatudina Excinum.	With Industry Borenier Luciane,	u e	With Partners. Suparintarying Excinera.	EVE EVE	With laterial Suprinterding Engineer.
1	Surat end Broach.	Kaira,	Ahmad- abad.	Sholapar.	Bljspar.	Total average includiag Exami- acr's Auxi. Mary	gatara.	Belgaum.	Klandesh.	Poons.	Dharwat.	Nasik,	Ahmednagar.
	1	61	3	Ą	٥	•		80	a	10	11	13	. 23
45 Provincial Civil Works	39-10	168-34	67 93	146.50	63-26	i	25,03	68.25	No Expenditure.	12.03	(No Expeaditure, 184, Charge , 30	57.25 of 25.70	26-19
45.—Incorporated Local Fund	9.73	1178	10.33	11.08	12.05	;	11.06	11 20	18	:	ı	11.68	E A
46Kabudel Local Fand, Depo-	Expenditure 33,035	\$ 13-08	718	12:21	18-53	1	4:58	433	14.5	950	0211	3.33	Errendl. 3,950
46,-Ordinary Contributions .	Expenditure No charge.		0.63	#	Expenditure 261		6.9	Expenditure 3,318	Expenditure . 995 .	210	Expenditure 1,850	5 470	i
45Imperial Civil Works	18	17.98	55.5	18.03	37 85	;	14.20	13	17.03	17 07	11 61	19 05	19:13
Barrack Department (Separate Budget).	, 1	2	2	21	:	1	17.8	82	Erpendlare 338	82.EZ *	21	177	15.5
35,Imperial Protective terigation Works.	: 1	i	:	i	ŧ	(0-52)	i	:	(No charge, 11.2	62.	:	55	13
43Imperial Irrigation Minor			7	2									
. Schitzl	i	:	19.03	Kochare	: <u>-</u> يــ	:	£	•	i	17.8	;	17.63	\$
. Berenne	i	;	13.3	6.27	1876	:	33	81	6.44	61 19	290	;	2217
2nd Class , Revenue	21.7	:	17 76	ī	17-06	!	:	17 05	200	2921	63.3	ā	1
En.	18-6	8	3.0	IP.83	es	١,	63	Expenditure 1,200 Charge . 79	\$	12.13	Expenditao	35.18	109 28
42.—Imperfal Irrigation Major Vorks—					و در در در در در در در در در در در در در	,, 							1
Working Expenses	:	;	23.3	8	1	1	37	:	9.10	763	:	159 25	20 202
43.—Províncial Irrigation Minor Works (Gokak).	:	: •	ī.	:	:	i	;	<b>S</b> £	:	!	:	ŧ	***

Mr. M. Vis- 1. Q. (The President.) You are the Executive Engineer vesvaraya. for Irrigution, Posos ?—Yes. Mr. M. Vis-

- 20 Dec. 01. 2. Q How long have you held that position?—For two years and eight months.
  - 3: Q. Where were you previous to that ?—I was utinched to the office of the Superintending Engioeer, Central
  - 4. Q. What are your duties here?—I have charge of the Mutha and Nira Caaula including their storage reservoirs, four small tenks, two or three famino works, and the woter-aupply of Poonu and Kirkee cantonments.
  - the wotor-supply of Poonu and Kirkee cantonmonts.

    5. Q. You say, "The cultorable area commanded by the works is 289,981 neres or uboat 12 per coat. of the total calturable area of the district. There is room for further extension, especially in the northere half of the district." How much do you estimate of the culturable area is notually calturated every year?—Nearly the whole area is calturated; the cultivation by means of irrigation is, however, only about 60,000 axes. The rest is ou rainfall.
  - 6. Q. You say there is room for further oriension, especially in the northorn half of the distrist—what extension do you contemplate?—There are a number of small rivers on which resorvoirs may be hold. In the north-eastern portion of the district, irrigation might be practised from storage reservoirs, esnetructed near the ghits. The whole area would want a systematic examples. inntion.
  - 7. Q. With reference to what you say about there being room for further extension, is that from personal knowledge?—No, not entirely; that is my general impression formed in my tours in the northern part of the district. No surroys have been made except o very long time ago; probably about 25 years ugo.
  - 8. Q. You say in yoar note, "the reason of more favourable results in this district is that large storage works, which luve an unfailing ghât sapply hure been constructed in combination with canals which reach down to tracts of scanty or ancertain rainfall." You refer here to the Kharakwaslo?—Yes und the Nira Canal also.
  - 9. Q. Do you know whether in this district any other surreys bore been made?—We have recently made surveys in the river valleys in four places. Mr. Bealo has the results of the preliminary surveys. We have prepared rough estimates for works costing about 60 lakks of rupees.
  - 10. Q. What manner of works are these?—Three out of the four are works of n productive nature; that is, they would be worked for growing high-class crops.
  - . 11. Q. Do they depend on reservoirs ?- Yes.
  - 12. Q. Where ure they ?-On the Pauna and the Motha rivers in the ghat region and the Kara river on the plains.
  - 13. Q. These projects are to strengthen the Mutha Canal? -Partly; two of them are intended for that purpose.
  - 14. Q. What is the discharge on the Muthu Canal?—It is not more than 250 cubic feet per second; we propose to increase it to shout 500 cubic feet per second.
  - 15. Q. What is the discharge from the NirnF-About 450 cubic feet per second; we propose to increase it to over 700.
  - 16. Q. Then you have not a general scheme for the whole district.—No; there is a let to be surveyed before a general scheme can be formulated.
  - 17. Q. Do you find the people on the Nira Const ready to take water always?—They are ready now. Before 1878, there was more water than there was demand for. That was due to sufficiency of minfall; we may be returning to the same state of things again. If there is a good rainfall there will not be much demand for dry crop irrigation. On the Much Const we have not account of the const we have not seen the same state. the Mutha Caual we have no water to give for rabi crops.
  - 18. Q. If there is good rainfall, say up to the end of September, then you would start the rabi crops ?—Yes.
  - 19. Q. Without irrigation P—They almost always sow on rain, except io a year of drought. They wait for rain. If the raiofall is insufficient they ask for cand water. In one year out of three they get enough rain for a fair
    - 20. Q. When !- From September to November.
  - 21. Q. (Mr. Muir-Mackenzie.)-Is it necessary to get the November rains in order to get a good orop?—Yes, or at least at the end of Ostobor. If the later rain fails, they require water from the esnal.

- 22. Q. Without the water could they not get any crop?— That depends on the character of the rainfall. If the quantity or distribution of rain be insufficient or unsatis-fuctory, the crop will be very inferior.
- 23. Q. In a good year you woold reckon on the October rainfall ? Yes.
- 24. Q. The later the rainfall the better the crop?— Early rain is ulso accessary for acwing. If the late rains fail, they always use eacal water.
- 25. Q. (The President.)—You say, "Where there is obrouse desciency of rainfall thore is demand for water overy year on black soil also?"—Yes, in the eastern parts of this district.
- 26. Q. Do you mean even in ordinary years?—Yes; under the small tanks in the eastern or dry parts of this district, there is a demand for water in the rabi season every year.
- 27. Q. Although it is black seil?—Yes, if they get good rain they prefer to raise the crops on minfall; otherwise they fall back on the canal.
- 28. Q. You say it is no disadvantage to have black soil where the water-supply is perennial, you mean for sagaresue?—Yss and even for dry crops in the drier tracts.
- 20. Q. Do they grow sugarcano freely?-Yes, but the black seil wants a lot of manure.
- SO. Q. You say, "the rivers and streams in the northern part of the district are suited for extension of irrigation to that region." You know the soil in the northern part?— Yes; it is lighter than io the south.
- 31. Q. Therefore it will take irrigation more freely ?-
- 32. Q. Is there any proposal for u survey P-A long time ago surveys were made, but when they took up the Nira, they probably thought they had done enough for the district.
  - 88. Q. There are no Provincial Works ?-No. None.
- 31. Q. Have the villagers never been in the habit of making irrigation tanks ?—Not in recent years.
- 35. Q. There are no rains of old tanks?—Those are some small tanks used for water-supply or washing, by men
- 36. Q. In some parts of the Bembay Presidency there are tanks in every village?—That is not the case here.
- 37. Q. (Mr. Muir-Mackenzie.)—Havo yon served iu Gojarat?—Yes. I was in Surat.
- 38. Q. (The President.)—Comparing the soil here and in Gajarat, I suppose there is more black soil there than here?—Yes, but the soil here does not crack as in Gajarat.
- 30. Q. Do you know anything of the Tapti valley scheme?—I have heard of it. I think a scheme of that magnitude should be given a trial notwithstanding the black soil. No chance has been given for such works in Gujarat yet, on a large scale. I do not eeo why we should not construct a large casul.
- 40. Q. You say, "enquiries show that doring the drought of 1809-1901 the water-supply of wells rau short. Do you know how long it took to rue short, did it begin to break down in the first dry year?—I think it first broke down ut the oud of 1899 or beginning of 1800. I was not here in 1896; 1897 and 1898 were fuirly good years.
- 41. Q. Have you ever thought as to whether it was necessary to require applications to he made overy year for water. Is at not n discouragement to the outlivator to go through all the necessary formalizies?—In the case of the small tanks I think water applications should be dipensed with; on large canals, this cannot be done. It the mensoon we stretch a point and ullow oultivators to take water. There is a Government Resolution which permits the watering of dry crop in the measoon before accepting water applications.
- 42. Q. Is there any use in the application system ?— It is of great use after the monsoon, for dry weather and percunial crops, whou the water-supply is limited.
- 43 Q. What advantage do you attach to it ?—It prevents our necepting responsibility for watering u larger area than there is water for. We have to calculate for what area we can give water. We cannot promite un indefinite amount. We usually determine the supply available in November after the mouseen and no find out for what area we cau give water and restrict the applications accordingly. At the end of the meason we have a certain another of storage in the tanks which can irrigate a cartain limited

area only. If everybody were allowed to take water, the water-supply would run out in the middle of the season and the crops would suffer.

- 44. Q. What are you afraid of if you give up the system?—For instance on the Mutha Canal we have about 8,000 million cubic feet of water ordinarily. The storage varies. If the later mensoon rains fail, wholly or partly, this storage is drawn upon earlier in the season, and there is the further disadvantage that the normal flow in the river stops earlier than in seasons of good rainfall. In a good year, therefore, the water-supply may suffice for 30 to 40 per cent. larger area than after an unsatisfactory monsoon. 600n.
- 45. Q. Does the supply vary very largely ?-Yes, to the extent mentioned already; we raise the water above crost level by means of temporary standards and boards. That makes a difference of about 600 million cubic feet.
- 46. Q. In a year of drought you connect depend upon having the Muthn reservoir full?—No, not to the top of the temporary weir crest. We store water at the end of the mensoen 2 to 4 feet above the orest of the waste weir by means of a temporary weir of standards and planks; whether the tank fills to the top level of the planks or not depends on the inter moreon rains. This also introduces an element of uncertainty in regard to the quantity of water available.
- 47. Q. Do you think that, generally speaking, you would get the full supply or not?—We are cortain of the lake alling every year up to the top of masonry crest.
- 48, Q. Then when you begin the rabi irrigation in October and November you should be able to count upon a certain amount of water P—The difficulty is that if the later mouseon rains fail, there is no water in the river to speak of and we have to draw upon the storage earlier. We cannot be certain what storage will be available till about the beginning of Decomber: that is our great difficulty. We have tried to work this out scientifically for the post two or three years. If we had failed to do this, there might have been extensive failures of coops by untimely failure of have been extensive failures of crops by untimely failure of
- 49. Q. Between what limits can you count P—Tho difference will be 20 to 25 per cent. between short and full storage; ence will be 20 to 20 per cent between short and this storage; we cannot put up the planks early enough to make sure of a full tank because there is danger of heavy floods overtopping the plank weir and raising the storage to an unsafe lovel. If, on the other hand, the planks are put in late and the later rains fail there may be no replenishment in that season. These circumstances render the storage uncertaint with the Weiterstein course. tain within the limits stated.
- 50. Q. The remedy is, I suppose, a supplementary reservoir ?—Yes.
- 51. Q. If you had that supplementary re-ervoir could you count upon a fairly uniform discharge?—The uncertain conditions in that case will go lower down. Now up to Loui we have got a fairly satisfactory supply throughout the year, and if we build another re-ervoir, the limit will be shifted. 12 miles further dawn, and beyond that limit the uncertainty will continue. The fact is we want very much larger storage than we have at present.
- 52. Q. Are you aware that on the great oanal systems of Northern India no applications are ever asked for ?—The villagers send up applications on the Sone Canals.
- 53. Q. I am talking of the Punjab and North-Western Provinces?—I am not aware of the conditions there.
- 51, Q. The village gets a certain number of sluices and the people work them; they distribute the water and there are no applications?—We cannot do that here; our water is too valuable except in the monsoons when the rivers are full. Our storage at other times is very expensive.
- 55. Q. You say in your Note, "Irrigation works get ne credit for increase of land revenue." Is that the case P -Yes.
- 56. Q. Is not an owner's rate charged on land ?- Not in the Bombay Presidency.
- 57. C. There is a book credit given to the canal, is there not?—Not on the new capital account works.
- (Mr. Muir Mackenzie.) The land is not assessed wet on Government irrigation works. The water rate is kept quite distinct from the land revenue. In theory the canal gets all the oredit it deserves, though in practice it may not get all. There may be some enhancement made owing to the increased security.
- 58. Q. (The President.) Thou the canal does not got full credit for what it does for the country P-It does not.

59. Q. (Mr. Ibbetson.)—Does not the introduction of Mr. M. Visa canal bring new land under cultivation?—(Mr. Muir vessuraya. Mackenzia.)—No, only the cultivation of old land is rendered more secure. There is only one per esut, waste even where 20 Dec. 01. there is no canal. If credit were given I think it would only increase book complications without any material uny nucrease book complications without any material addition of revenue to the caual.

Witness.—Noither could we guarantee the water-supply every year for irrigating the whole area new classed as irrigable.

60. Q. (The President.)—If you have sufficient storage reservoirs?—In that case, we can guarantee to the extent of the storage only; it depends again on the nature of the

[120 President.—It seems very important for the Bombay Presidency that all credit should be given to canals.

Mr. Muir-Mackenzie.-It would complicate accounts, without, I think, much advantage to the canals.

Witness.—(Continuing) You say, we might give water permanently without applications; what rate would you six?—(The President.) Its. 3 an acre for wheat.

Witness .- Our working expenses amount to about lts. 3-8, so it would not pay if the crop rate was only is. 3 per acre. We have a net revenue new of over Rs. 3,50,000.]

- fit. Q. I don't quite understand your point?—The more you extend irrigation the more you lose; our rovenue depends on the nature of crops more than on the area. A large extension of low-lated crops is a disadvantage from the point of view of revenue.
- 62. Q. I don't yet see your point?—Would you charge by the quantity of water or the crea irrigated?
- 63. Q. By the area? Thore would be the difference of Rs. 2 and Rs. 40 per nore that I spoke of.
- of Rs. 2 and Rs. 40 per nore that I spoke of.

  Of Q. Would you say to a man if he asked for irrigation for a dry crop, I cannot give you water because there is so much required for sugarcane?—The water-supply is hypothecated for a certain area and only the balance is a vailable. If every one were allowed to take water as he chose the supply would run short. In Northern India they admit as much water into the cannil as they can and they prefer wasting it down the canal where there is a chance of some of it being used to allowing it to run to waste in the river itself; here in Bombay we try to draw from our storage reservoirs as little as would just meet our wants because the water-supply saved is reserved for future uso.
- off. Q. In Northern India it is true that the rivers have a large discharge, but it varies and the supply in the canal is often insufficient?—There, I think, more than three-quarters is dry crup; here we have to regulate the amounts; one million cubic feet will grow 13 to 2 acres of sugarcano; for the rabi crops it will be 12 to 15 acres.
- 66. Q. Do the people that are growing sugarcane have to send in applications?—Yes; the sowings begin in February and go on into March and April; we calculate what supply will be available; we only take applications to the extent that we have water for.
- 67. Q. Dou't you think it possible to bring down your working expenses? We cannot in the case of high-rated
- 68. Q. Your working expenses are enormous compared with Northern India?-- I don't think so, our crop rates also are very high; compared with the capital cost of the works our charges are modorate.
- 69. Q. (Mr. Muir-Mackenzie.)—Our present working expenses are so much disguised by the system of accounts that it is impossible to got at them.

Witness .- Will you pleaso refer to page 12 of my Memorandom about the system of accounts in this tresidency; we can manipulate the area; for instance, we could cheek the area under sugarcane and increase that on rabi crops one acro of sugarcane is equivalent to about eight aces of rabi crops; on the Mutha Canal, by refusing water for erno we could brigate 40,000 acres instead of the 8,000 acres at present.

70. Q. (The President.)—Which is the best way of protecting the country against famine?—I think working on "preductive" lines; we should not lock up water on the chance of a famine; we should every year make an estimate of the water available for high class crops, and in famine years make some concession in favour of dry crops; please see and 12 section 0 of any llarge and any Another please see page 17, section 0 of my Alemonandum. Another point, in this Precidency, is that we have about 300,000 acres, which are estimated to be irrigable, but we only work up to 160,000. In other Presidencies they work almost up to their maximum.

Mr. M. Vis-

- Mr. M. Vis- 71. Q. It comes to this that in the famines, which do nafortunately occur, Aladras and the Punjah can protect themselves but Bombay cannot on second of the system 20 Dic. 01. to flowed :—I consider that water should not be reserved to a large extent for dry crops in a famine year because it would disorganize the cultivation of higo class crops; I had much rather have a fixed area of high class crops from year to year then reserve water for dry crops for which the decay is stock in ordinary rears, and only hecomore. year to year then reserve water for dry crops for when the domand is slack in ordinary years, and only becomes keen in years of drought; my proposals an this point are explained in section 9, page 18 of my Memorandum.
  - 72. Q. By 'fixed area' you practically mean sugar-eanc?—Yes, and garden erops; also a certain proportion of cereals and other orops.
  - 73. Q. Yon hegin to irrigate sugarcane in March?— Yes about February and March.
  - 74. Q. If you have a fixed area of sugareane you don't know in March if there is going to be on early monocon, and if the monsoon fails on the 1st of October and the tanks get dif, what would you do?—Oar ghôt reservoirs fill every year. We would only guarantee one-third of the area for which there is woter. In ordinary yours I would allow people to have cano under wells, but would not guarantee them water after October. That is the "permissible" area.
    75. Q. Your 'fixed' orce would be 'trictly limited?—Yes, otherwise the water-supply may fail.

Yes, otherwise the water-supply may fail.

- 76. Q. Is your "permissible" areo just what is over and above the "fixed f"-I should like to rofer you to section 9, page 17 of my Memarandam.
- 77. Q. As regards the "permissible area," if a man were to come and say—I want to start my sugorence now and nm prepared in November and December to go on with my well, would you make him pay less?—Yes,
- 78. Q. (Mr. Ibbelson.)—You say in a famiuo year you would refuse water to "permissible" cane and keep twowould retuse water to "permissible" cano and keep two-thirds for dry crops, but a mun gives in his application in March, and you don't knew till August how things will be? —I would accept his application conditionally on the water-supply being liable to be withdrawn if necessary in October
- 70. Q. De you restrict the area of sugarcane in a dry year?—Yes; we don't occept opplications freely.
- 80. Q. How do you know in March or April that it is going to be a dry year ?—We accept applications in Morch and we calculate the area for which we want mater up to the end of June, and issue passes accordingly. If we tide over the hot weother we have ample supply in the manson. After the monsoon also we usually have sufficient supply Arter the monsoon also we usually have sufficient supply for bringing to maturity crops sown in the previous hot weather. If the monsoon rainfall is gand end the tanks are full, we may give nater to the area which I have chassed as "permissible". If the water-supply is short, the per-missible area will be refused water and will have to fall buck upon wells. The "fixed" area will get water till March following. buck upon welle, March following.
- 81. Q. (The President.)-Is there much scope for exteasion of irrigation?—Yes; bul each work is judged by its direct productive value and if this is unsatisfactory the Government of Indio will hesitate to grant finids, no matter how strong the recommendations of the Commission may be. Sound finance is the test of success in irrigation as in other public department and cur first concorn should be to show n good return. In order to enoble us to show n good return we want to work our system on lines suited to local conditions and not on those kild down for other conditions in the North-Western Provinces and Punjab. Financial considerations are everything.
- 82. Q. We would not be here if financial considerations were everything. Don't you get as much money as you require for the maintenance of canals ?—It is stinted.
- 83. Q. Do you mean for construction of new works or maintenance of existing works?—Both—(paragraph 3, page 1 of Momerandum read out.)
- 84. Q. That is fer construction; are you etinted for maintenance?—The reduction in expenses on maintenance began with the abolition of the office of Chief Engineer and special Executive Engineers for Irrigation; from about 1885 the annual outlay, both for mointenance on old works and for new works, has been very low and the ton-denoy hos been towords severe economy.
- 85. Q. You have got works which ore not paying at oll?—My works in this district pay fairly well; they show the best results in the Presidency, because they are

- 86. Q. Do you consider that by spending more money you could get a greater return?—Yes, by increasing the scope of the works. For instance, the discharging capacity of the Mutha Canal may be increased from 250 cusees to
- 87. Q. World the expenses of maintenance be doubled?

  No, they would not be in the same proportion. If we provide more storage and work more on productive than on protective lines will our works pay. The more storage we have the more will our works pay. I guarantee that if I am given a chance to work the Nine Canal on our ornglines, we will apply the state of the full interest on the small couler. we will make it pay the full interest on the capital outlay; but there are two things necessary: we must be given more money and allowed to work on our own lines.
- 88. Q. In what may hove you been hitherto restricted? -The tendency of the orders of the Government of India has been in that direction (paragraph 3 of Resolution No 53-I., dated 9th March 1893, by Government of India, read out as in paragraph 3 of Memarandam.)
- 89. Q. (The President.)-Does the Government of India restrict you as to the amount you must use for engar-

Mr. Muir-Mackenzie.-Yes.

Witness.—Yes, and I have to look up water in expectation of its being utilized for other craps overy year.

- 90. Q. (Mr. Ibbetson.)—You would look to ceteras rather than to area ?—Yes; good returns are an indication that valuable crops are grown and the locality steadily benefits by the irrigation work.
- 91. Q. (Mr. Muir-Mackenzic) The Government of India say that certain works ero in by productive and certain protective. The Nira is a protective work and we can only give n limited quantity of its water for perennial crops after reserving sufficient to irrigate a reasonably lorge area under dry orops in a yenr of drought.
- 92. Q. (The President.)-As a result of the system you the year water moy remain numsed. If water is reserved for dry crops it may never be used in that particular season and may lie looked up till the next replenishment, or it moy be ran to waste.
- 93. Q Simply because it was kept for dry crops?— Mainly because of that; we have never been able to use the whole amply for high-class crops although there was the
- 64. Q. If there were no applications, nat a drop would have been wasted, if the people had utilized it, taking all the woter they liked?—If there are no applications and no control, the water-supply may run out in Morch or April, that is, in the middle of the second. We must control every port of the caual and regulate the flew in curounals accarding to the supply available; the circumstances are entirely different here to those in other provinces. We have a tendly different set of conditions and we desire that we may be allowed to manage things in our own way.
- 95. Q. The question is to protect the country against famino?—I should place irrigation in the first line of defence for protecting the country in times of famine, but irrigation connect entirely protect the country in such years. We must have irrigation works to the utmast extent possible but at a reasonable outlay,
- 96. Q. You say in paragraph 20, page 6 of your Memorandum, "in good seasons the black soil of the Decean yields a full harvest and in ordinary years a fair horvest;" I suppose there is great variety in the black soils?—Yes, there is a great variety.
- 97. Q. In some places more than others they take irrigation?—Black cotton soil is the worst for irrigation; is oracks; other classes of black soil which are mixed with sand or hove a murum sub-strotum are favourable, especially for sugarcane.
- 28. Q. Do yon know of what proportion of the Deccan black soil one might say that it cannot he irrigated at all?—A very smsll proportion. On all kinds of black cotton seil if there is a chonce of good rain, it pays the people to raise food craps and cereals on rainfall rather than on canal water. Irrigation from canals can be carried on with profit for growing all crops which cannot grow on rain sloas. We found at Ahucduagar, where the soil is black, they take water, but at Surat and Broach under no circumstances will they take it?—I think that there is, more sand in the Ahmeduagar soil. Scrat soil is inferior for purposes of irrigation. of irrigation.

- 199. Q. I see you say in paragraph 29, page 5, "during 1895-96 the area irrigated in the Decean and Guzarat vos 74,923 acres and the assessed revenue from water-rutes amounted to Rs. 4,62,476. During 1897-98, though the area use to 126,51d acres, the revenue amounted to Rs. 4,03,139 only, so that with an increase of 69 per ceut. In area the increase in revenue was about 9 per ceut. only?"—1897-98 was practically a famine year and there was function in the previous year. People were auxious to replenish their store of grain and there was un extension of try crep irrigation.
- 100. Q. The Maswad and Ekruk tanks cannot, I suppose, be connected with the gháts?—I think not the Ekruk; an attempt might be made with the Maswad; the question should be investigated.
- 101. Q. You say on page 8 in paragraph 6, "the formalities of the water applications and special measurements, etc., are also obstacles in the way of extensions of irrigation"; you proposed the "fixed" area on that ground?—in order to enable us to dispense with water applications by crops, I have proposed 'fixed irrigation" under my scheme. I propose a dispense with water applications entirely in the case of small arrigation works only.
- 102. Q. Would the "fixed area" be the same land every year?—It would be the same for six years and would then be changed. Under my scheme one-third of the water-supply will be given to the "fixed area" always; the remaining two-thirds will be given to the "permissible area" in good seasons and be applied to dry crops in seasons of drought.
- 103. Q. If a man held 300 neces he might without sandleg in an application grow sugarcane over 100 acres?—Yes, I should restrict the erea under sugarcane to one-third of the total urea of the blocks.
- 104. Q. He might grow it on any hundred acres?-Yes.
- 105. Q. Ite might change the field so long as he did not exceed the area?—Every village under command and which can be conveniently served by the canal should have one or two specified blocks to which trigation should be confined; the people of the village must agree oming themselves to practise irrigation in that block; people who have no land of their own may lease out plats from others, we is at prosent done, during the currency of the lease for water-supply. I should guarantee the water-supply for such blocks for six to siven years at a time.
- 100. Q. Don't you think six years too much?—No. We have sugarcane crop running six years without re-soning. That is unusual of course; the usual enstone is to have a ration crop for two or three years.
- 107. Q. (Mr. Muir-Mackenzie.)—Would you endeavour to make phads?—Yes; but people will do the distribution among themselves as tiny have done in Nusik and Khandeck; this point is explained in Mr. Beale's report.
- 108. Q. Within a certain aren the entireators would probably arrange their own rotation?—Yes. If we have a "fixed" area for which we guarantee water the people will lay out their money and manure their land; under the present system there is too much uncertainty.
- 100. (2. (The President.)—Would you bind them to take water?—This is explained in paragraph 65, sect. 9 of my noto (read out.) The proposals I have made are, I think, under the parent circumstances the best. If water were giren to any and every part of a village there would be sectoral loss. With the same quantity of mater we shall probably be able to irrigate 60 per cent. more area to block than if the irrigation were in scattered panches, admit there will be some difficulty in giving opportunities to all enhivators to irrigate, but they can arrange among themserves and obtain plots either in exchange or by lease as at present. At present enhivators from parts of the district where there is no small irrigation bring their capital and obtain lease of plots of land for sugmeans enhivation. The same might be done in connection with the blocks. Sanction to grant a block may be withheld until the villagers agree among themselves to give a shune to a reasonable proportion of the cultivators in the village. This seems to be the last possible system under existing circumstances, but if a better system is suggested we shall be glad to go into it and give it a time.

The population of the Bambay Presidency according to the census of 1901 was 16 millions; the net cropped area is more than 19 million acros, giving a rate of more than 1 sers of cropped area per head of population. In all other provinces—wide Appendix I of any Memorandum—the rate per head is less than 1 were. One reason why irrigation is not so extensively encouraged in this Presidency seems to be the large area cultivated compared with the population; if they get a good crop once in two or three years they can Mr. M. Visafford to live on it.

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Another point I wish to bring prominently to notice is the percentage of area of well irrigation on total cropped area; in Aladius this percentage is 4:89, in Bombay it is 3:40, while the corresponding percentages for tank and canal irrigation are 19:60 and 0:70 for Modras and Bombay respectively. I think these figures show that adequate provision is not made in Bombay and that there is large scope for the extension of canal and tank irrigation in this part of the country.

I have said already that the presention of cropped aren to population is larger in the Bombsy Presidency than elsewhere. Dry crop irrigation will not pay in Bombsy; over 92 per cout, of the irrigation in Madras is under paddy or rice. If rice is excluded, other irrigation, including percannal, is small. Irrigation is mainly a question of rice cultivation in Madras. We have very little rice cultivation in the Decean, because other food-grain crops like Juar and bajrs are grown on rainfall with less expenditure of labour and capital and less trouble than rice, which ordinarily requires irrigation in addition to rainfall.

- 110. Q. This country has suffered very much during the last few years from founce. Supposing you had reason to believe that in 10 years' time there would be another famine, what would you do for the Itreran before then?—Irrigation at the best will only be a partial remedy, but I should have works of several kinds—tanks fed by ghât rainfall. I should also try large canals constructed like the inundation cands elsewhere taken from rivers fed by ghât rainfall. I there can would be expensive, but the expense must be faced. The water which is now running to the sea will be carried in these canals which in a year of drought will distribute moisture over the whole country; depossions along its course teay be repelemented; and knowled water whenever such canals pass will be raised and well irrication will be encouraged. The next class of works, though not the least important, sto village tanks and wells on small rivers; these may be largely extended. From this class of works Government should not expect a large revenue. If they did, there would be no progress, but the indirect results will more than repay the outlay on them. As suggested n my Memorandum 12 lakls may be spent annually on irrigation works, 10 on larga tanks and canals, and 2 on minor viltage tanks and river weirs. But the more money available the better.
- 111. Q. What works would you propose to spend it on?— It is important to have a proper hydrographic survey of the country first.
- 112. Q. That won't cost very much?—Only 12 lakles per annum, for the next 8 to 10 years; there will then be some excellent schemes. Meantime we can carry out reasonably good schemes ulready projected.
- 113. Q.—(Mr. Muir. Mackenzie.)—Why are you confident that the schemes will be excellent; you will remember that a large number of projects in connection with Lake Fife and the Masuad were prepared which it was thought would be excellent, but they were not su?—I would like a reference to paragraph 30 of my Memorandum, in which I have explained why the Decan rooks were a failure. I have all along contended that if the works are managed on lines suited to local conditions they will show better results than they do now. I have admitted, however, that Bombay works will nover be as remanorative os works in Northern India. I don't ask that expenditure in this Presidency should be anything like what it is in other provinces, but there should be a reasonable nilouance made to this Presidency also, which there is not at present.
- 114. Q. How are you auto that the mistakes made in the past won't occur again?—I think we are wastr now.
- 116. Q. (Mr. Ibbetson.)—Why do you think in ten years these schemes will repay Government when the present schemes don't?—They will pay indirectly and they will pay also a reasonable direct return if the present anonulus and difficulties are removed.
- 116. Q. Do you think the present schemes do pay Government?—The Mutha pays more than 3 per cent. and the Nira about 2 per cent. and on the two, if indirect results are taken into account, the return to Government, if I may risk an estimate, is probably more than 6 per cent.
- 117. Q. (The President.)—Do you put us your first condition certainty of supply? That certainty is always possible in reservoirs fed by glat minfull.
- 118. Q. Having got your survey and knowing all about the country, where would you look for the first means of

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Mr. M. Fig. security; would you look to the storage of the ghat supply? vesvaraya. —Yes, and then go to the plains.

- 20 Dec. 01.

  119. Q. (Mr. Higham.)—With regard to the new storage
  works on the ghôte. I nuderstand these are the only proposals made?—Yos, I have submitted rough schemes for four new tanks for this district.
  - 120. Q. Are there any ather possibilities af etarage P-There must be several other eito. These are all that have been examined.
  - 121. Q. Where?—In the northern parts of the Peona district. Also, the existing works the Nim and Mutha Canals, may be extended by increasing their storage by means af new tauks and by extending the cauals and their distributaries.
  - 122. Q. You can make more storage works than are shown here?—I think many more.
  - 123. Q. Suppose yan get a greater increase of storage tanks, could you use them?—We could if we work on the lines I have suggested now. We should extend the entitivation of crops which do not depend on rainfall.
  - 124 Q. Yaa would not extend your area of cultiva-tion?—The totsl area may not increase; our cultivation in ordinary years should be intensive.
  - 125. Q. I am epeaking of this tract of the Poons dis trict in which you have no irrigation; could you extend irrigation on that by finding more ctorage teaks in the ghate?—I think so; na detailed surveys have been made; we have rough surveys made in some few instances chowing that it in possible.
  - 126. Q. Could you make a new branch to the Nira Canal 120. Q. Come you make a new branch to the Nira Canal and divert n portion af the supply to another part of the district, if you have a greater supply available at the head of the canal?—We can extend by taking a branch from the Nua Canal to Satam and Sholapur. Mr Beale has an idea of having a banneh canal.
  - 127. Q Provided you got water?—Yee; storage must be first pravided. Before we think at extensions, we should increase storage for the Matha Canal in this district. The present canal is 70 miles long and half af it is not working. There is ample scope for using all the water we can storo np in the ghata.
  - 128. Q Could you command the north-castern part of the district by the ghat tanks ?—I believe so.
  - 129. Q. What about the Bhima ?-It is very law; it is very deep; but if we have a very high were it may be possible to take water for irrigation from it; whother such a echeme is financially possible depends upon the result of
  - 190. Q. What about stomge?—We should probably have to store water near the ghats and take water a long way in the rivers and raise where required by means of pick-up
  - 131. Q. Can't you store up on the ghats?-Wo can, sir, but no regular survoys have been made.
  - 132. Q. I suppose na proposals have been made because the river is much below the level of the country?—Yes, that is the general impression. But we may be able to find sites for reservoirs though we chall have to go a long way to get command.
  - 133. Q. Lest year, 1900-01, you irrigated over 52,000 acres on the Nira Canal? Yes; I can irrigate 100,000, if nicessary. Area and the nature of crops irrigated should both he tuken into consideration in estimating the results in any year.
    - 134. Q You irrigated 47,000 acres in 1897-98?-Yes,
    - 135. Q. And 42,000 in 1896-97 ?-Yes.
  - 136. Q. These were the largest areas?-Yes, in recent venra.
  - 137. Q. Wero they all very dry years?-Yes; axcept 1897-98, when in order to ropleuish their stack of grain, the oultivators irrigated a very much larger area than usual; they did not wnit for rain-water.
  - 188. Q. What was your supply in 1897-98? -Our supply at the tanks was full.
  - 1s9. Q. You had sufficient supply all through 1899?—No in 1899, the Bhatghar Lake did not fill. We restricted out area and regulated our supply.
  - 140. Q. This shows a much larger area because it includes greater area of food craps and less of sugarcana?—Yes; the proportion of the sugarcane crop is only 10 per cent. on that canal.
  - 141. Q. Of the normal area?-Yee, 10 per cent. of the normal arcs.

- 142. Q.—How much this year ?—We have got the same area, aheat 6,000 acres of perennial crops. I have uet gat the figures for the first official year here, as the Revenue Report is not ont.
- 143. Q. Yau do not know what it was ?-No, I have got figures for other years.
- 144. Q. Yan had a very small area in 1892-93?—Yes the canal was young then, and not developed.
- 145. Q. In a wet year what ie the effect on the area ?-It will probably ga down to 30,000 acres. It there is pleuty of raia, water is taken only for personnial crops and a little perhaps for juar; some water is atways taken for rabi.
- 146. Q. (The President.)—Is there any rice at all?—No; very little.
  - 147. Q. Not worth mentioning !-- No.
- 149. Q. (Mr. Higham.)—Dose engarcane come under kharif or under rabi ?—Under kharif (explains from the hook).
- 149. Q. Take 1898.99; you had 34,000 acres; yan ear it was mostly percunial?—No, it was not mostly percunial.
- it was messiy persunial rank, it was not mostly persunial, 150. Q. (The President.)—You put it too strangly when you said that in a wet year thera would be nathing but persunial crops?—I mean that in a wet year the of the revenue will be from percunial crops; that from the other crops would be very simil, through their srea may be comparatively large. But area alooo is not a true index of the results. One acre of sugarcane is equivalent to 8 to the results. One ac 10 acres of dry crops.
- 151. Q. Undar any oircumstances would the area of percential crops he more than 25 per cent? Never.
- 152. Q. (Mr. Mnir-Mackenzie.)—By your system you can take it in a third?—Yes, in the blecks only. Outside the blocks, the dry arop area will preponderate.
- 163. Q. How maeb of your area would be perennial under your system f—About 10 per cenl.; percunial crops would get 1rd of the water-supply, but one acre of cano takes as much water as 15 acres of other crops so the area would only be about 16th.
- 154. Q. (Mr. Higham.)—You say, "we are not allowed to work on our own lines," who do you mean by "we"—the Local Government?—No, the Dopartment.
- 15b Q You are not allowed to work on your own system?—No, not in the manner we thick best adapted to local eirenmetances.
- 156. Q. You attribute this to some orders of the Government of India ?— Yes.
- 167. Q. What orders are they?—The Government of India have laid down a general policy for all the provinces.
- 158 Q. Where is that policy laid down? I do not see it here?—(Reads.) It is laid down here.

  159. Q. You say this means that the canal is not to be worked for productive purposes.—That is what we generally understand.
- understand.

  160. Q. Yon say you are fettered by the Government of India. Where are the orders?—I do not say there is any specific order of the Government of India which applies to this Presidency alone, but the general impression of the Government of India is that where there is extensive irrigation that means protection. In our experience here protection does not mean production. Government have hid down general rules for all provinces, but they work badly here. We are guided by the rules and general policy of the Government of India.
- 161. Q. In this particular cass the Government of Iudia . merely remark that in a sesson of drought there has been a decrease at area. It is usual to expect an increase of area. un a dry year. It seems a harmless remark on which to base each an assertion?—But increase of area means in a large number of eacs, decrease in revenue in the opecial circumstance of this Presidency.
- eircumetaneea of this Presidency.

  162. Q. That remark may he made in regard to any canal in a sessen of drought. I do not see how you can conceine it in the way you do?—For this reason; our water-supply in a year of drought is limited and we have to help the percannial crops of the purrious year and provide water far a reasonable area of new sowings af the same class of crops. If water is diverted from thesa to increase the area of dry crops, inrigation af percannial crops would be disorganised. In this Presidency we ought to look to valuable crops rather than the extension of area.
- 163. Q. You have no other order to restrict your supply to protection of dry orops?—No direct orders. I think it is the impression of the Government of India that wherever

there is extension of area under irrigation there is protection. Protection means production elsewhere, but not here.

- 164. Q. Has your Public Works Department ever made any representation to Govornment on the matter f—I think so. I cannot say definitely what they have done, but they must have represented the difficulties several times.
- 165. Q. To explain your plan a little more fully why do you restrict the sees to 3rd of the available water-supply F Because we can guarantee water-supply to that extent only in a year of drought.
- 166. Q. Why don't you propose to restrict to 18,000 acres?—Because you object to our working the ranal on productive lines in ordinary years and protective in famine years. Possibly I may not be very clear; it is not 3rd of the area; it is 3rd of the water-supply.
- 167. Q. One-third of the water-supply P-Yes; I would set that apart for perennial crops every year; that would give fixity to irrigation.
- 168. Q. You guarantee and of the water-supply to perennial crops f-Yes, to the blocks in which I propose to carry on "fixed" irrigation.
- 169. Q. They can use the water for what they like?—No: I would have about one-third of the area only under sugarcane; some such condition would have to be put in.
- 170. Q. Yon would not interfere in any way with the village?—Not so leng as they manage properly. If they wasted water or quarrelled among themselves, we may interfero and regulate.
- 171. Q. Will they not look upon it as a permanent assessment?—We don't want permanent assessment; no only want fixity for six or seven years. I should accept joint applications from each village for six years.
- 172. Q. What would you charge for \$1d water-supply? -About Rs. 12 to Rs. 16 per nore.
- 173. Q. If you guarantee and of the supply, how can you charge upon nereage t-The area which one third of the supply annually uvailable can irrigate will be estimated. This area will be distributed among the villages. There will be a fixed rate per acre on this area. The only condition imposed will be that the area under sugarcane should not be more than one-third of the total area of the block.
- 174. Q. You will estimate what the area would be ?-Yes; approximately. It is much easier to estimate for a block than for a field.
- 175. Q. Will you measure the area every year?-No; once measured, the "fixed" area is known.
- 176. Q. You say, "I give you for his years it supply and we estimate that you should trigate so many acres?"—But one-third of the supply has nothing to do with the individual villages. The entire area of the blocks of all the villages will require one-third of the anpply.
- 177. Q Suppose the supply is short?-We guarantee only ird of the minimum available supply. Our glist-fed tanks always fill-even in a year of severe drought.
- 178. Q. (The President)—For statistical purpose, you would measure up the area !- Blocks are fixed for six years and the area is known. No measurement is necessary every 1 car.
- 179. Q. Suppose a man has got one or two fields outside the area and puts in sugaranc?—We would not give him water rue pt on the permissible system.
- 180 Q. (Mr. Muir-Mackenzic.)—Do you take it for granted that they would take water?—They are willing to take it on these lines on the Nira Canal; people have aheady seat in applications. I believe the Local Covernment is favourably disposed to give the scheme a trial if it is shown to be practicable.
- 181. Q. (Mr. Higham.)-You think you will irrigate a larger area of percunul crops it you guarantee them and of the supply than they have irrigated in the past?—Yes, we have now 5,000 serve of sugarcase on the Nira that brings about a lakh of revenue; we should have 7,000 under thy repente :
- 182. Q. Why?—Because during years of good minfall we can give water for personnial crops which in bad years will be protected by wolls.
- 183. Q What would provent them from putting down sugarcano now under the present system !—They are not cure of the woter-supply; if rain fulls, we restrict the supply.
- 184. Q. The cultivotion of percunial crops on the Mutha Canol is now more or less a garoble?—I think so, as regards \$rd or \$th of the area.

- 185. Q. Is the supply to perennial crops uncertain on Mr. M. Vister Nira Conal?—Yes, it depends on the locality. In the vestaraya. upper reaches the crops are practically safe. In the middle of the canal the supply is uncertain.
  - 20 Dec. 01.
  - 186. Q. Taking an average ?-About 4th is uncertain.
- 187. Q. (Mr. Ibbetson.)—There would be less gambling under your new system !—Yes.
- 183. Q. And then in addition to that you would have also the 'percaulal' area on which there would be a certain amount of chance ?—Yos, that is a great point.
- 189. Q. (Mr. Higham.)-What do the people do in the pear of famino; do they reduce the area of cane of their own accord and increase the area of food crops?—We reduce the area of sugarcane for them; the whole thing is done by us. My experience in this district is that the demand for sugarcane in a bad year is as great as in ordinary years.
- 190. Q. I think the Bombay Government have several tirnes explained the redection in the area under sugaronne as duo to fumine and plague ? - It was due to the low rate of raw sugar in 1897 and 1898; these abnormal causes operated also. But since 1899, io which year I took charge of these enfals, the domand for water for sogarcane has been as keen as for dry crups.
- 191. Q. Orlinarily considered, records would collinate as inucle cause as they possibly can even in a famine f-Yes; that is the teodency.
- 192. Q I approve in a famino year an acre of eace is quite as good as an acre of fodder crops ? A great deal better; it will employ more men and for 12 mooths justead of 4.
- 193. Q. An aere of augarcano requires more water than As acre of dry orops?—Yes; about 8 to 10 times more. The gross produce per acro of sugarcano is valued at about 18. 600 and folder crops fetch about Rs. 80 in a famine year and Rs. 80 in ordinary years.
- 191. Q. (The President.)—How many cubic feet do you require for an acce of sugarranc P—About B or 4 lakhs of cubic feet. The yield of came is worth about 72 times that from rabi crops,
- 185. Q. It will pay you better to uso your water upon dry crofs than it will nuon sugarcane crop if sugoreant takes 10 titles the amount of water and only yields 72 times the produce?—But the demand far engarcane is constant; not so for the dry crops. Desides, the dry crops require water chiler in the monsoon or in the rabi season when the water is not so valuable.
- 196. Q. Coold you irrigate seven times os great an area of dry crops as you could of cano if you stop sugarcane altogether?—Ten thues more of rabi; for every acre of cane we can inigate 10 or 12 acres of dry crops.
- 107. Q. Would water be taken ?-Only in years of drought, not always. For percential crops the demand is constant.
- 103. Q. (Mr. Muir-Mackenzie.) Do you think that the rates now charged on the Nira Canal are unnecessarily low? Do you think that people can pay a higher rate?—
  I think the rates are very good now, but they ore capable of increase in three or four years' time.
  - 199. Q. Why must we wait ?-On account of famine.
- 200. Q. Propie on the conal are rich and prices of crops have rison ?-Yes.
- 201. Q. Why do you say we ought not to increase them; I ask you generally whether the rates charged are in your opinion excessive or too low?—For ordinary, dry, and mousoon crops the rates are fair ; for cane the rate is low.
- 202. Q. How long ago were these rates discussed? -On the Nin Canal very recently; on occount of famine they have not enhanced the rates.
- 203. Q. (Mr. Higham)—Could you give me details of your expenditure on Revenue establishment—the establishment that you have to maintain on the Niro Canal ?-Yes. (Refere to statoment I C.)
- 201. Q. What is your charge on establishment? About 20 per rent. of the gross revenue.
- 203. Q. What do you allow for collection?-Five per cent. on total receipts.
  - 206 Q. Who does that go to !- The Civil Dopartment.
- 207. O Twomiy-fire per cont, is taken for the main-tenance of local establishment ?—Yes.
- 203. Q. Do you know how they exactly divide the estab-lishment between the work; and evenue ?-We have got

a certain amount of expenditure on works and repairs; on that they charge 25 per cent. The whole of the balance goes against the Rovenne establishment. vesvaraya.

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- 200. Q. You recommend as one means of protecting the provinces from famine that the Government of India should allow you to spend about 10 lakha a year on new
- 210. Q. Is that 10 laklis for the whole province or fer the Poona district ?—For the Presidency proper excluding Sindh.
- 211. Q. I think the cost of irrigation works on an average is about Rs. 200 per sere?—Yes, according to the present system of accounts.
- 212. Q. Ten lakhs a year would ultimately go to increase the area by 5,000 ucres per annum? -Yes.
- 213. Q. At the end of 20 years you would be prepared to meet fumine with 100,000 nerce?—Ves, it looks small, but it would mean double the present area.
- 214. Q, What percentage would that be of the area under oultivation?—Something very small; I do not expect any great results from irrigation alono; have said so in my Memorandum.
- 215 Q. You say double the provent area?—It is not enough; if you give 20 lukhe it would be a very good thing.—I only montioned what we were likely to get; not what I thought was necessary. Before the famino we were getting 1 or 2 lakhs a year. So 10 lakhs are a large amount comparatively. I would welcome 20 to 30 lakhs.
- 216. Q. (Mr Ibbetson.)-The cane is a very valuable erop; you cannot afford to ried it; it takes a large quantity of water; you must know how much you have to provide for. In your note von early the cultivator grows for der crops in the hope of being able to do it without your unter; he goes on waiting from day to-day hoping for rain and when he does want your water he wants it in a hurry and must get it at once; any delay on account of his having to submit an application would be very injurious; would it do to have applications for case only, to give the came area preference but allow people to use the balance of the nater as they third?—In the mensoon there is no difficulty; on many cands there is some water to spare and this they can use. There is n Government order permutting us to give water for dry crops without waiting for application.
- 217 Q. Hate you never in your time imposed double rates on men for tiking water without application !- Not on dry crops, except when all the water was required for crops for which water applications had been accepted.
- 218. Q. Why not extend the same principle to those who take water for fodder crop, wheat, gram and fuar when they choose at the end of monsoon as long as you get your sugarence watered?—Our water-supply becomes very valuable after the monsoon Our stool is limited and we valuable after the monsoen. Our stook is limited and have to use it in as profitable a manner as twenthe. have to regulate between sugarence and other crops.
- 219. Q. Suppose you give sugarcane the preference then would you give water for other crops without application?—Only where we have an ultimated supply. The supply is so uncertain; we have to look inhead and provide for sogarcane sowings in Murch or April,
- 220. Q. Before 180 , I understand that a great deal of your water was unused on these canals?—To n great extent; it was in 1898 als; but we nover have any water unused in these days, not during these last three years.
  - 221. Q. Before that P-The people would not take it.
- 222. Q. Would they not have used your water if you had allowed them to take it without making an application?
  —It might have had some slight effect: perhaps about 6 per cent, but we did not want to let the aron to go out of our hands.
- 223. Q In a good year you abolish application?—No, we rolax stringency, in accordance with the orders of Gov-
- 221. Q. The application system would only be worked strictly in a bad year?—Yes, but sometimes we have to place restriction year after year, except in the moonsoon, if there is a coasiderable extension of perennial crops under the canal. This remark applies to the Mutha Canal only, which is a productive work.
- 225 Q. In your scheme of irrigation you guarantee 3rd of the water-supply, presumably for cane irrigation, and give 3rd on your permissible system; if people are willing to give 3rd on your permissible system why not get the urt 3rd aton on the same terms, that is have 3rds permissible and no fixed area? Because in the permissible

- area then there would be uncertainty of oultivation; water would not be available in a year of drought,
- 226 Q. Do you think they will always prepare their land for 1rd if it is fixed 9-Yes.
- 227. Q. They won't prepare for 3rds?—They will sow every year; my object in having 3rd permissible is to have 3rd of the water-supply in a famine year for dry crops. They prefer to have an assured supply which would only be a wininble for the "fixed" nrea.
- 228. Q. (Mr. Muir-Mackenzie.)—If you don't have a fixed area you don't get extension?—No.
- 229. Q. (Mr. Ibbetson) You say this permissible water would be very largely used by people with wells ! Yes.
- 230. Q. Is it not waste to give oanal water to people who have got wells?—It pays them to use cansi mater. If they are left to wells alone, unnided by canal water in good years, they will abundon irrigation.
- 231. Q Speading of tunks, you say " smaller tanks perform a useful office in Madras, namely, to protect the rice or during a break in the weather." Why should not they do the same in the Decem ?—Because they have rice in Madras; we have no rice here.
- 202. Q. 14 there no rice in the Decean?—Very little; there is rice on the hills, of an inferior kind; it does not pay the cultivators to go to the expense of rice caltivation here.
- 233. Q. Would small tanks be of use generally in the Deccan ?-Yes, small tanks will do good in many ways.
- 284. Q. Hew?-There will be moisture and the waterjevol in wells will be high in the neighbourhood.
- 235. Q. Would there be any irrigation?—A perhaps; indirect irrigation from wells there will be. -A little
- 236. Q. Directly they won't pay ?-No; small tanks will not pay in the Decean.
- 237. Q. Do you think people would be ready to contribute for their construction?—I think they may be neked. The experiment is worth a trial.
- 238. Q. You say, "one reason why well irrigation is not largely practised in that the sub-soil over wide areas is rocky buyon think popple nould use wells hargely if they had them; would it be profitable to work them irrespective of the east of making them?—In a famino year they would
  - 239. Q. That would be one year in ten?-Yes.
- 240. Q. Would it pay n mon to use n well if it were made for him?—It would depend on the enterprise of the man; if capital and manure were forthcoming it would pay.
- 241. Q. You say that it is by artificial debits that working expenses are enhanced i-Not as regards the woking expenses; the charges are fair on the Nira and Mutha Canals; but in regard to capital expenditure there are artificial debits. are artificial debits.
- 212. Q. Is the capital expenditure enhanced?—Yes; to some extent by artificial debits.
  243. Q. On the Matha and Nira Canals you have sepa-
- rate establishments for supervision of irrigation?-Yes.
- 241. Q. Your working charges ore actually what itcosts ? - Yes.
- 243. Q. There is no artificial debit !-- I am not prepared to go so far as that.
  - 216. Q 1s there a large artificial debit?-No.
  - 217. Q. They are mainly netval?-Yes.
- 218. Q. You say that the actual average working expenses would be about Rs. 3 per nere?—Yee; they vary; Rs. 3 ore for the whole area in the Presidency. On the Mutha Canal the working expenses amount to Rs 7, because the principal crop is sugarcane.
- 249. Q. You say that'an nere of cane costs much more for maintenance than an acre of juari?—Yes.
- 250. Q. What makes up Rs. 7?-Maintenance, repairs, and establishment.
- 251. Q. You say the avarage is Rs. 3, and cane, which forms a substantial portion of your crops costs Rs. 7. What does just and wheat cost?—A good deal less.
  - 252.. Q. Could you give me an idea? Say Re. 1-8.
- 253. Q. Suppose you double the area of wheat and justi you would not double your expenses ?—Nô, we would reduce them, that is, judged by the rate per acre.
  - 25 L. Q. Your lis. 3 includes all crops ?-Yes.

- 255. Q. What is Rs. 1-8?—For wheat and rabi crops only; the average is Rs. 3.
- 256. Q. As radi only page Rs. 2 and working expenses are Rs. 3, therefore you say it would not pay you to increase your area under wheat? I am referring to the results in the whole Presidency. We have get about 100,000 acres under inigation. I have said the total area considered irrigable is 300,000; supposing we had all those 300,000 ander radi area our total revenue would be less than what it is now.
- 257. Q. On page 13, you say; "the Executive Engineer is required to keep his tanks and canals up to a certain standard of efficiency and when he has done thus the water may run to waste or remain lacked up in the tanks for all he cares." Is this an exaggeration?—I say so to make the position clour. We have not worked that way in this district.
- 253. Q. What I want to know is this. Is there anything in the present system which could show to the Executive Engineer how the causal pays?—The Revenue report shows that
- 259. Q. Not until the Revenue report comest-No, the final lighter site cent to the press by the Examiner, Public Works Accounts.
- 260. Q Could be not get an idea ?-Yes, a rough idea from more and expenditure in his own accounts.
- 261. Q. Is there anything which you would suggest to outble the Executive Engineer to have a keener in eight into the use of water?—I think the Executive Ingineer must study carefully the irilgating capacity of the work, and watch the operations from week to week; otherwise if there is a deficiency of water the crops will suffer or water may be locked up and remains unused.
- 262. Q. All these things depend on the man who has charge ?—Yes; I have get charge of the Mutha Cmal, and if I do not cith the selt, I may show a saving af, say, Rs. 10,000 and get enedit, the re-ulting evil effects will not be felt in my time, but in my successors.
- 263. Q. Is there then anything you could suggest that would give the Executive Engineer a keener ineight?—If a programme is drawn up to see mouth by mouth what water there is and what mea under irrigation, the Executive Engineer will be able to take steps to, stop extension of irrigation if the water-supply is scanty, or to extend the same if the supply be abundant. If they know that we are able to give water liberally, probably people at the tail of the canel will take it. There has always been less water than there was demand for in my time.
- 264. Q. You never had surplus water P—We never had more water than we could use during the last three years. In good years, they do not want it for ordinary dry crops, and then there is a surplus.
- and then three is a surpus.

  265. Q. Do you know the reason of the difference between Imperial and Provincial districts ?—There are several classes of works in progress in a district. Irrigation Work (Imperial), Military Works (Imperial), Reads and Buildings (Provincial.) The district is classed as Imperial if works of that class prependente, or Provincial, if the major portion of the expenditure in the district is from Provincial Funds. Certain fixed percentages are elanged for establishment on all miscellaneous works and the balances of expenditure debited on bloc to the class of works which decides the classification of the district. In the Shelapur district only fixed percentages are charged on irrigation works (refers to para. 36 and reads from Appendix, page 23), and the result is the establishment charges are very low in that district.
- 260. Q. At page 10, paragraph 30 of your Note you say. Total east of maintenance, including share of revenue management." What is the share?—They charge 25 per cont. on actual works expenditure.
- 267. Q. Of the two canals, which do you say is protective P-The Nim.
- 268. Q. I understand that you actually held up water in reserve in order to provide against a year of drought?—Yes.
- 260. Q. Are there any orders to that effect?—It is regulated by practice and by the general impression that the Government of India want a large area of food and fooder crops to be irrigated, especially during years of scarcity.
- 270. Q. The general impression is that the Government of India wish that food and fodder crops should be protected?—Yes.
- 271. Q. There are no specific orders? -I have already quoted some orders which can be read that way. I have

- also explained why the Government of India associate Mr. M. Fisincreased area with improved results.
- 272. Q. You say you cannot give sufficient water for high class craps?—Yes, now-a-days, to the extent there is 20 Dec. 01. demand for it.
- 273. Q. Practically there is no demand for water, except for these high class crops, in a year of fair rainfull?—No large demand.
- 274. Q We were told yesterdny that certain people would take any amount of water for dry crops if you give it every your?—There is no demand for thry crops; they won't take the water; they will wait till the last moment for ram, and if rain fails, then they rush for canal water.
- 275. Q. They won't begin to irrigate before they know that the rain will not come?—Yes, they won't insure their crops beforehand.
- 276. Q. You say, "fear of enhancement of revenus exists in the case of well irrigation;" do you say that from your own knowledge?—The statement has not be correct; I have heard reports, but have no personal knowledge.
- 277. Q. (Mr. Muir-Mackenzie.)—Have you ever heard people say so ?—Yes; I think it is not a fact.
- 278. Q. (Mr. Ibbetson.)—There is no enhancement, but they are alraid?—Yes, there is no death about that. It would be a good thing if Government published their intention broadenst; then there will be no fear.
- 279. Q. Do you suppose that in this district there is one year of famine in ten?—I could not say. There have been four bad years within the past six years.
- 280. Q. How many scanty rainfalls are there in ten tears P-In the epstora part of the district it would be quite five.
- 251. Q. In the western parts ?-Nine years out of ton are fairly good.
- 282. Q. How many years in the eastern part?—Four good years, five had years, and one a funine or very had year.
- 288. Q Do you know why Government has prohibited the irrigation of sugarcane in the neighbourhood of towns and villages !—For sanitary reasons.
- 284. Q. Are you forbidden to give water to sugarcane within a quarter of a mile from the villages?—Yos; if there is a nulla between, water is allowed; otherwise irrigation of percunial crops is generally forbidden, within a mile of villages.
- 285. Q. (Mr Muir-Mackenzie.)—Is there an order to that effect?—Yes.
- 256. Q. Can you produce it ?—Yes; I can There are atrong objections to a heavily minured erop in the vicinity of a village.
- 287. Q. (Mr. Ibbetson.)—What kinds of crop are heavily manured?—Sugarcane especially. Whenever there was irrigation formerly it is not provented; but only extension of irrigation to new lands within ‡ mile is.
- 258. Q. In compensation given to water-logged lands P—I have never received an application; I should think Government would be very favourably disposed to consider applications in cases where any real damage is caused by water-logging.
- 289. Q. (Mr. Rajaratna Midir.)—I find that the capital outlay on irrigation works in the Bombay Presidency, direct and indirect, was 486 lakhs, of which you have only cleared off 5 lakhs to the end of the year, thus leaving a large amount on the wrong side of the account. No wonder the Government of India objects to further grants; can you tell me how this is P—It is due chiefly to accoundation of interest charges. I have already said that our works do not pay The yearly not revenue falls short of the interest charges on the capital laid out.
- 200. Q. Now jurn to the Mutha Canal, do you know that the capital outlay was 02 lakks and the interest 62 lakks. Why is the interest so high?—The work was spread over a number of years and though practically completed in about 1875, there are works still going on which are always to expital. Besides, the yearly net revenue does not yet cover the interest charges on the capital.
- 201. Q. (The President.)—I suppose the dam was very costly and the cost high in proportion to the size of the canal?—Yes, also it took many years to complete the work.
- 202. Q. (Mr. Rajaratna Mdr.)—Do you think it possible that by building storage works you could make the entals pay a larger return?—Yes. At the present moment there are two schemes for increasing the storage of the Muths

Mr. M. Vis. Canal nuder consideration. The proposed storage reservoirs vesvaraya, will probably cost from 15 to 18 lakhe of rupses. They are mentioned in Mr. Reale's report.

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- 293. Q. They have not been forwarded to the Government of Iadia?—No. They are only rough setimates based on preliminary surveys.
- 294. Q. On the first pogo of your answers you give the culturable area as 289,881, what does that represent?—The total culturable area commanded by the new irrigation works in the Posna distrist.
- 295. Q. Will the existing works irrigate that large urea? —That is only the area commanded.
- 296. Q. The actual area irrigated is not given; can you tell what the area irrigated will be when all the works are completed?—I cannot give it for the whole Presidency; in the Poona district about 65,000 to 100,000 acres con be irrigated annually.
- 297. Q. Could you irrigate a larger area if you extended the area of dry crops?—Yes, we could make the Nira Caual works irrigate a larger area if we gavon larger amount of water to dry crops than we at present do, but more area means inferior crops.
- 208. Q. Against the Mutha Canal large revenues are shown under miscellaneous, indirect and direct. Can you explain it?—They isolado receipts from the water-supply to the Poone Centenment, which amount to about Re. 1,25,000.
- 298. Q. On the Nira and Mutha Canals how mush sugarcane or perennial crops is under irrigation?—Under the Mutha about 4,600 acres and on the Nira about 5,600 acres.
- 30°. Q. Can those meas be increased f Yes, if we reduce the other class of irrigation. On the Mutha we have reached the limit, but on the Nira we could decrease the area of rabicrops and increase that under personals.
- 301. Q. I notice that the rabi crop except in years of drought is 14 or 15 thousand?—That is during years of very seasonable rainfall: ordinerily the area is about 25 thousand acres.
- 303. Q. On page 4 of your Noto you say that irrigation works get no oredit for increase in land revenue. On you get no oredit?—We get practically none. They get 90 per cent. in Sind. We do not increase the had revenue bere on account of the emals Perhaps you refor to 2nd class irrigation works such as bandharas on which a consell-dated rate is fixed. On these we get about 65 per cent. of the consolidated rate oreulted to the works. Under first class works no portion of the land revenue is credited to the works.
- 303. Q. If you add the water-rate to the land assessment, what proportion is the water-rate?—The Nira Canal is what is called a Capital Account work and land-rate and water-rate have no connection with one another. In the case of second class works, the figures are given in the Irrigation Reyenue Report for the Bombay Pre-idency.
- 301 Q. When wasto lands are brought under cultivation for the first time, do you not take credit for land assessment in addition to the water-rate?—No, I am not aware of any such oredit.
- 305. Q Yon say you would have a fixed area for which you would allow irrigation under your "block" system; will not this bonofit only a favoured few?—The blocks, it is true, will be on land owned by a few people, but all the villagers who require to participate, may obtain share of the area by exchange or lease for the period the water-supply is guaranteed to the block. The water-supply to a block will be groated only after the villagors have come to a satisfactory agreement among themselves in this respect.
- 306. Q. You fix the block in the holdings of two or three rayats; would it not be passible to fix a share in each rayat's holding?—If we give a water-apply to any field wherever situated the waste of water would be very serious. The water which would be saved under the block system, would probably suffice for one-third to one-half more area. There is now a lot of wasts from field to field on the distributaries.
- 307. Q. Is your plan workable in practice?—Yos. I think so.
- 308. Q. But only n certain number of rayats will benefit by it?—We propose blocks of 50 acres or more, and we propose that all the villagers should share in the benefits of the fixed area.
- 209. Q. I think there is a serious objection to fix the block at 50 asics. Why not appointed it according to the holdings f-Yes, you may do that.
- 310. Q. According to your proposal the poorer men will be excluded ?—We can easily frame rules to bring in oll

- who want a share. Before sanotioning a block, the cultivators should be asked to come to an under-funding among themselves in this respect. Obtaining land by lease for sugaroane cultivation is a common practice in this district.
- 311. Q. On page 8 of your Note, you say that on the Nira Canal the rate paid is 15 to 20 rupees for sugarcano, is that the maximum; don't you charge 40 to 50 rupees sometimes f—The rate-given is the average rate for sugarcane.
- 312. Q. In regard to clause 3 of the same paragraph on page 8, is the rate charged on the whols area er only the irrigated urea?—On the whole area, whether irrigated or rat
- 313. Q. In regard to paragraph 22 on page 9, have there been no eases of private canals?—Not that I am aware of
- 314. Q. Do you permit the construction of canals if the people consent to pay enhanced water-rates?—If they build them at their own cost, we may remit the water-rate for, say, 10 years.
- 816. Q. In there scope for private canals in the Poona district P—Yes, if liberal concessions are given, but Government should be prepared to lose money. Elther Government should construct the canals themselves or forego irrigation rates for a long time. The people want a quisk return.
- SIG. Q. If we gave remission for five or ten years, would that induce the peaple? Would capitalists take the matter up?—Yes, but there is the question of ownership of land.
- 317. Q. But supposing Government assisted them in acquiring lands?—Then I think extension on minor streams would be possible to a very limited extent.
- S18. Q. Now in regard to the system of applications from rayuts, you know what area is irrigated; could you not dispense with the applications, subject to the condition that if a man wishes to change his four-month crop into perennial he must apply P—There are three or four classes of crops and I do not think it would be possible. ...
- 919. Q. For each village the area is known. You make your approximate estimate and tell the rayat that he is at liberty to take water until he changes his crop. Would that not work?—The cultivators changes he crops so eften that there would be trouble in regard to the sufficiency of the water-supply. I am suio it is not pussible on these canals. If we bound our close to give water, the agriculturists might sow perennial or rabi or any other class of crops. This varies according to the nature of the crops and if a large proportion is perunnial or rich crops which require water, say, in the hot weather, the water-supply may fail. I'er regulation of water-supply, both area and class of crops irrigated should be known.
- 320. Q. Pat if they change the crops they must tell you?—I don't think they will take water on those terms, as they constantly change. The notices would give quito as much trouble as the applications.
- 321. Q. But the notices would be fewer than the applications?—Yes, but it is must necessary that we should know especially in seisons of drought, what crops we are to have.
- 322. Q. You can measure them up?—There would be practical working difficulties. We might do it over a restricted area but not over the whole district. We want to know early what water is required, as we may have to restrict the new sowings of sugarvane or perennial crops.
- 323. Q. I don't see what the diffirnties are?—There would be serious difficulties. Your proposals would do for small tanks, but not for such large works as we have in this district. We must knew within 100 to 150 acres what crops we have to give water to. The crops sown in a good year may extend to a year of drought and fail for want of a sufficient water-supply.
- a sulfinent water-supply.

  321. Q. (Mr. Muir-Mackenzie.)—I notice that in Mr. Brale's report the working expenses of the Nira Caual and only 1.75 in ordinary years and Re. 1 in maximum year. I do not understand the Rs. 3 per eero that you mention in your note. Do you mean both the Nira and Mutha, or the Nira ulene?—About Rs. 3 is the average rate of working-expenses for the whole Presidency. It includes artifisial debits. Tide page 29 of the Irrigation Royenue Report for 1899-1900.
- 325 Q. What about the Mutha?—The average does not hold good for the Mutha Chan, as the crops grown under it are chiefly sugarcane or other perennial crops, and the rate of working expenses for such crops is very high.

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- 326. Q. On the Prayam river and the Lakh Canals the average in ordinary years is Rs. 18 P.—That is an artificial rate, not the actual.
- 327. Q. Also on the Kadwa ?—Yes. The high charges in both Nasik and Ahmednagar districts are due to their artificial classification as "Imperial" districts, as explained on page 10 of my Memorandum.
- 328. Q. Ou a work like the Maladevi, which will irrigate 30,000 acres in ordinary times and 60,000 at other times, the conditions are not dissimiler to these of the Nira. Will the irrigation charges be higher than these of the Mira?—No. Mr. Beale had calculated the charges on the maximum area, where is it should be calculated on the average, which will be a much smaller area. If the work is in an Irrigation Division we might expect a little over Re. I though air. Beale estimates Rs. 3.
- 829. Q. I gather that there is no doubt that in years of ordinary rain in il you have a considerable amount of water to spare in the Nira?—We have had no such experience the drought avortook us, but previous to that thers used to be a surplus.
- 330. Q. In a year of good rainfall, might not you dispense with the applications, other than for come, after the monsoon has declared itself?—Nes, but in that case we would have to enlarge our distillularies, as the crope sown might otherwise come to harm. In the monscon there would be no grent difficulty. We do allow the cultivators to take water in the monscon before cauctioning the applications.
- 331. Q. After the monsoon?—After the monsoon we work the rules very strictly, as we have to be very eareful. Otherwise the water-supply may fail and the crops may be
- 332. Q. You generally know about September whether you will have a good minfull. Well if you were assured of that, could you not dispense with the applications!—We have on the Niza about 140 miles of canal and the discharge in the hot weather is often not more than 100 enbio feet per second, and if we disponsed with applications the cultivators would probably use the islade supply up early in the season. We might dispense with applications in regard to the upper 30 nules of the canal, but even in that reach the area under irrigation should be determined by measurement for regulation of the water-supply.
- 333. Q. But if you are sure there would be water?—We have distributaries of limited discharging capacity. They would have to be onlarged so as to be able to carry the maximum supply that might be required.
- 231. Q. In order to get rid of those applications you might increase your outlets?—Yes, we might do that.
- 385. Q. Haro you any hope that if you dispense with the opplications the people would irrigate more?-They won't irrigate much more than they do naw; I think there might be an increase of 5 or 10 per cent. If you remove all restrictions, there would be an increase, but there is the question of practicability. We might try it over restricted areas if a trial is necessary.
- 936. Q. I understand that the prohibition to the cultivation of porennial oraps near towns and villagee is restricted to future extensions only ?-Yes. That is so.
- 337. Q. Do you nee pondrette on the Nira Canal?-Yes, the people are now collecting night-sod in the villages.
- 333. Q. And fish manuro !- Yes, they are using fish maouro also.
- 330. Q. But they do use night-soil in the Nira Canal villages ?-- Yes, they do use it to come extent; they get it from the rubbish heaps. They don't collect it systematically except in Baramatl.
- 340. Q. Mr. Mollison informs us that in Khod they are taking great pains to collect it -I don't know about Khed, I know they use poutrette, fish and oil cake largely on the Nura and Mutha Canals. They get the cake from Gujarat and the Sabarmati.
  - 311. Q. Is safflower cake not uned ?-I cannot say.
- 312. Q. Is it your experience that the people fear en-hancement of revenue if they sink wells?-Though I -Though I

- cannot give any definite instances, that is the general Mr. M. Visopinion.
- 348. Q. Have you acticed that it has any effect in dotoring the people from applying for takavi?—I should not like to say; I have no personal experience one way or the
- 344. Q. You say that if Gavernment construct wolls in private holdings the wells will be more expensive by reason of the cultivators labour not being utilized?—The work will be more substantial and last longer but will cost more.
- 345. Q. If the cultivator can make it for Rs 500, how much will Government spend?—There will be e want of personal interest in Government servants and I think the expenses will be about 50% more.
- 846. Q. To come to this "fixed" area of yours, I undorstand that it is fixed not only in the matter of extent, but also in the matter of locality. You are particularly anxious that certain plots should be fixed f—Yes, my object is to save less of water. Under eld works, you notice, the thals or irrigable areas are fixed in this nay.
- 347. Q. You would like to see large storage tanks in the glifts, do you mean that they must be located in the ghats?

  Not necessarily; suitable sites on the rivers would do well enough. But the further away you make them from the ghats the higher would the dams have to be and mesonry dams are expensive. Very high earth dams are a source of danger in the monecons.
- 318. Q. Would the ghat tanks lond themselves to famino labour? Not often, but people could be employed on the canala,
- 349. Q. Would you kindly tell mo whether you think that the crops in the famine year on the Niva Canal were equal to or superior to the crops grown in other parts in a year of good minfull?—Yes, the yield was equal to that of a year of good rainfall; it was more valuable and fetched higher prices.
- 350. Q. You would nover get n 16 anna crop from the land?-We would often get a 12 to 15 anna crop, but nover less than 8 annas.
- 351. Q. Would you like to see the whole area given up to percanial crops in ordinary years?—No, I would not like the whole area given up to percanial crops. I would like the dry crop to go on by rotation to a certain extent, as they keep the distributaries in order to render the water ing of large areas easy in times of famino at abort notice. It is not difficult to restrict the perennicl areas in famine Years.
- 352. Q. Sapporing the restrictions were removed, would 502. 14. Supposing the restrictions were removed worth it he possible to supply water for the dry crops in famins years?—Yea, but there would be great difficulty after the beginning of the rabi season. We might have a large area to water and an insufficient water-supply.
- 853. Q. If you managed the works on productive principles would it be difficult to make them protective in a year of famine P.—Yes, if managed solely on productive principles in ordlinary years.
- 85%. Q. If you work on productive principles there is great danger of the works losing their protective characteristic in a year of famine?—That is so if by protection is meant the saving of dry crops.
- 355. Q. If a crop is grawn in black cotton soil this year it must be manned to give a good crep the following year; nuless manured an inferior crep will result. That is an established fact; is not that so?—Yes.
- 356 Q. Do you helieve that irrigation is of value in deep black cotton soil without a murum sub soil?-With light Wateringe and sufficient manure, deep black cotton soil may be utilized for irilgation to some extent chiefly for the richer olasses of crops.
- 857. Q. It is a soil not requiring a great deal of water ?

  You. They take garden crops on such soil from rolls.
- 358. Q On-deep blook cotton soils?—Yes; they are irrigated by wells to a certain extent in this and other Decean districts. They are not good for growing, by irrigation, crops usually grown on rainfall.

WITE BES No. 56 .- MR. 11. V. R. KEMBALL, Executive Engineer, Presidency.

2. Q. You held charge of the Poons District in the 20 Dec. 01.

Q. (The President) .- You are Executive Engineer, Presidency District, Bombay ?--Yes.

last lamine ?- Yes.

- Mr H. V. 3. Q. From what you saw of the famine hero, what do R. Kemball. you think would be the best coorse for Government to adopt io order to be prepared to resist another famine?—That is a difficult question to answer. It is a question of ways and means.
  - and means.

    4. Q. Presuming the means were avoilable, what would you suggest?—I would suggest storage tanks in the glants with pick up weirs in the rivers where they are wouted Choiae of tanks as far as possible non the rivers to be filled from the pick up weirs. My owe opinion is that it would be very exponeive to carry water direct by eanals from recognition in the cluster. reservoirs in the ghuts.
  - 6. Q. What do you think of storage casals in the beds of the rivers?—I dea't think they would answer and they would be very expensive.
  - 6. Q. More expensive than reservoirs, at the head of the apply?—Yes. And on the small rivers their filling onunct be ensured.
  - 7. Q. Is there a better chance of finding a site for large reservoirs in the plane or the hills?—In the hills. There are many sites in the hills, but the difficulty is to get the water away from them.
  - 8. Q. Why not lot the water go down to rivers ?—That is what I edvecate, but I buve not given the subject a great deal of thought.
  - 9. Q. You have been on relief works, what do you thick the best form of famine relief labour?—It is more easy to say which is the worst. I think that road metal breaking is the worst. I thought at the beginning that it was a good test of destitution, but I have changed my mind. There who are poor loss heart and those who are well-off are satisfied with small carnings.
  - with small carnings.

    10. Q. You do road work with the molal?—The question is whether the road is wanted or should be maiotained. The present roads were aligned before the railways were made und the alignments are not suitable to present day conditions. What is wanted is roads from the trads centres to the main or goods railway stations. If such new roads were made they would have leavy traffic. Funds for repairs are limited and it is no use meking roads or metalling old ones unless you can afford to maintain them.
  - 11. Q. Were such roads made during the famine? programmo was deficient and few such roads were made. was new to the district

- 12. Q. The country roads are not very much used. Some are not. Roads with light traffic need little making, only roads with heavy traffic need installing. It costs is 300 c mile to maintain a metalled road and unless you can afford this it is a wasto of money to metal it.
- 13. Q What kind of work then do you recommend?—It is difficult to find works that are useful unless you take up tank works. I have no objection to those in the absence of a cheaper form of fumine labour, but they necessitate subadiary expenditure and have to be left unfinished sometimes.
- 14. Q. But I suppose generally speaking they will be furnished afterwards f-Yes, I think the greater the extension of irrigation the greater the prosperity of the country and the greater the power to resist famine.
- 15. Q. (Mr. Higham).—I suppose that in the Poons die-trict there is nothing more to be done in the way of read making?—I think a number of the present reads might be unmade ned now ones made in their places.
- Thou there is room for roads in certain places?-Yes, in places where there are no reads now, but where there should be roads
- 17. Q. Why is metal breaking a bad test of distress f—Because the people don't like it, and cease may oxense for shirking. It requires good management, able-bodied men for ganging are few if the supply of metal for breaking falls short the workers are fined for no fault of their own. The workers who are well off do little and do not care what they care. I found several of the villagers came to the worke only to see their friends. the works only to see their friends.
- 18. Q. The question is, is it n good test or not?—It is a good test, but not so good as I thought at first that it was.
- 19. Q. (Mr. Ibbetson).—I suppose you are living more or less from hand to month as to the matter of famine programmes?—Yes, more or less. It takes time and thought to make a famine programme before I left I put a few useful works in the programme which I could not do before because I was new in the district. The programmes are now complete, but the estimates of the projects are not yet.

WITNESS No. 37 .- MR. E O. MAWSON, C.E., Execulive Engineer, Poons District.

I .- Memo. by Witness.

## POONA DISTRICT.

Mr. E Q Manson 20 Dec 01.

There are two Executive Engineer charges in the Poons There are two Executive Engineer charges in the Pocaa District, one for Irrigation and the other for Roads and Buildings. The whole of the district was affected by the late frame; in the Reads and Buildings office the only works undertaken were the enactruction of new roads, the improvement of old roads and tracts and the collection of a metal reserve. On the construction and improvements of roads a sun of Rs. 4,64,659 was expended, while the amount spent on the collection of metal was Rs. 8,12,015. The works uncompleted at the end of the fuming were works uncompleted at the end of the famine were

Indapur-Baramati Road.—This work is a road improvement scheme situated in the south-east corner of the district; and its construction will facilitate the spread of irrigation on the Nira Canal.

Bhimashonkar-Dimbah Road.—Is a ghat read running east and west in the Northern talula of Khed. It will form a most useful road for bringing hirdu and other bill produce from the Ghats.

Rajenadi-Malsiras Road.—This road connects the Poona District with the most barron talukas of Shelapur.

Paud-Borkas Road—Is a ghat road opening up the hill country immediately to the west of l'oona and will be

most useful in encouraging the hirds and other forest

Walke Parineka Road-Is a feeder road to the Southern Meratha Railway. It is a bill road and will open up the fertile Pariacha valley.

It would be nf very great advantage to the Poona District if the above works could all be completed from Provincial Funds. The Local Funds are not in a position to do more than keep in repair the partiens of the roads and by famine labour, and owing to plague, etc., it will be very difficult even to do this; and there appears an possibility of the muounts spent during the famine being made renamerative, either actively by tolls or possively by the opening up of oow tracts unless the cost of completing the construction is borne by Provincial Funds. The Bhinashankar-Dimban 1.00d is especially mressary to be completed as this link with the Chuts and to the principal religious fair in the district will increese the traftic on the whole of the main roads. There is already a famine programme for the Poona District and this is now undergoing revision and extension. Surveys for new works are now in It would be ne very great advanlage to the Poona Disrevision and extension. Envrys for new works me now in progress to the extent of establishment available and new projects are under preparation. As a gards the irrigation questions (ride Government Resolution No. 2825 of 2nd November 1901), they appertuin to the office of the Execulive Engineer for Irrigation, Poous.

Statement of works completed, etc., under the Executive Engineer, Poona District, during the famine Mr. E. O. of 1900-1901, as required by paragraphs 9 and 120 of Government Resolution No. 2275, Marson.

Famine Department, dated 26th October 1901.

					2(
No.	Name and elsesification of works.	Amount expended.	Completed or uncompleted. Incomplete works it is 'destrable to complete as a charge sgainst Provincini on imperial Revenue	Reasons for proposing their early coupletion and results anticipated.	Remarks,
,-	Construction of new roads.	Řs.			
1	Construction of a read from Rajewadl to Mal- siras and Mawdi.	95,029	Incomplote in respect of masonry works, which would cost about Rs. 4,063. It is not emergent to incur this expanditure.	Rs. 300 can be advantageously speut in preserving the work done from going into ruin.	
2	Construction of a carr track from Khadkalla via Bourkhind to join the Talegaon-A m b e g a o n Road.	13,684	Incomplete in respect of the approach on the south side of the Khind which would cost about its, 30,003.	poned till funds are available.  Rs. 300 can be spent for the	
3	Construction of Talegam Railway Station Road.	19,971	Completed.	******	
4	Construction of a road from Dimbha to Bhimashankar.		Incomplete in respect of the last 3, miles in the ghats,	To make the road fully useful for stuffic both on this aud on the other side of the ghats, it is necessary to construct the last 31 miles and a bridge ou the Goho Nallah. Those would cost about Rs. 28,750.	
5	Coustruction of a road from Paud to Bhoreas.	28,651	Incomplete in respect of nincoury works.	It is absolutely necessary to incur an expenditure of its. 9,023 to make the road passable for cards. Cross drainage works must be done to preserve the work that is already done.	
6	Construction of a road from Junuar to Ghoda.	44,416	Completed		A causeway at a cost of about Rs. 2,000 to the Meens River is, lowever,necessary when funds are available.
7	Construction of a road from Walha to Pariucha.	14,000	Incomplete	To make the road useful as a feeder road to the railway, it is necessary to incur about Rs 8,400 on cross drainage works and other petty items.	
	Metalling or Metal Col- lection on roads.				
8	Collecting metal on the Poons-Sholapur Road.	1,58,184	h		
8	Collecting metal on the Poons-Nasik Road.	2,02,733			
10	Collecting metal on the Bomhay-Poona Mail Road.	95,262			
11	Collecting metal on the Poona-Nagar Road.	3,83,910	Completed .	The metal collected will be used up in repairs and in metal-	
12	Collecting metal on the Junuar Nara yangaon Road.		-	ling the reads.	
13	Improvements to the Inda- pur-Baramati Head.	1			*Rs. 1,566 incurred from ordinary funds to complete unfinished itoms.

Mr. E. Q. II.-Mauson.

I.—Note on the possibility of protecting from drought the eastern portions of the following districts:—Nasik, Ahmednagar, Poona, Satara, Sholapur, Belgaum, Dharwar, and Bijapur.

Dharvar, and Bijapur.

Natural Features.—The western talnkas af Nosik Poons, Sutam, and Belgonm coatain the Gluts with spars running down to the Decenn. This strip of country, varying from 4,000 to 2,000 feet above sea level, is from 20 to 35 miles wide. The rainfall on the western edge of the Ghats is from 350 to 200 inches per aunum while that of the castern side of this strip af coantry is 80 to 40 inches.

Nogar has only one talukn within the Ghat area while Sholapar, Dharwar, and Bijapar lying farther cost have a general lower lovel (about 1,500 feet) with small detached groups of hills.

Parallel to the Ghot line is a strip of country 25 to 30 miles in width with a fairly reliable rainfall of from 20 to 30 inches, while in the castern talukas of Nasik, Nagar. Satara, and Belgoum and in the whole of Sholapur and Bijapur the rainfall (uverage about 28 inches) is variable and liable to fail.

On the Ghnts and 20 miles to the east the rainfall is certain and excessive in amount; while in the middle atrip of country it is practicelly anticient for an 8-anna crop even in bad years and it is probable that any irrigation within this strip of land would need some nursing and would be of high class ar perennial crops.

The ealtivators would wait in the hopes of getting anficient rain, evon if their crops were beginning to wither, rother than pay for water. Moreover, it would be dilimit to give water so as to save the crops over any considerable area when the ground had not been properly prepared nor deries made hecause most of the land in the area under consideration has too great a slope to be irrigable without previous levelling of the fields. Most of the land in this area is good black soil over maram; on which high class and perenaial crops would do well and pay if the water were to be picked up by weirs on the rivers—The Krishno and Rovari Canals in Satorn may be quoted as inslances of this form of irrigation.

The land of the eastern talukas of Nagar, Poena, Satam, and much in Sholapur and Bijapur is poor; there mo atretahes of miles of inwram or shallow soil on which it would not be possible to grow irrigated crops.

The most of the good land is on the banks of the streams and rivors, generally fairly level black soil forming flat ralleys between low ranges of hills or more often hetween the modulating poor land sloping on each side from the block soil. Un account of this notural formation pick np wors at short interruls on the rivers seem to be the most suitable form of protection so as to enable the water to be turned juto the good loud with a minimum length of canni-

There are two principal objections to large storage tank in this part of the Decean which may perhaps partly explain the wont of success from a financial point of most of the works already constructed—

- (1) As n rule it is necessory to have n considerable length of canal with little or no irrigation because the suitable dam sites are not near good irrigable land. The canals have often to be taken through muram in which the loss by percolation is very great.
- (2) The storage tanks have been constructed with a riew to famine relief and not with the object of protection from famine; thus the dams no situated in truets lieble to tailure of rain and the sites hare been selected not as those most saitable for poying irrigation schemes but to provide work where it was most wonted daring previous famines.

The works ore therefore heavily hundicapped to start with and cannot be expected to be connectative nor can they be considered as traly protective, because in ordinary years the rainfall being sufficient for the crops the oulti-vator will not prepare his land for urrigation on the chance of drought, and when most wanted, the water can be only partially token advantage of.

The land which can be protected from large storage tanks with long canals mast, from the nature of the formation and soil in the Decean, constitute a series of isolated areas with large unprotected tracts surrounding them. It would appear odvisable to have a greater number of small works spread over as much country as possible. It seems probable

that such works would also pay become if water for irrigotion can he mode available close to the land to be irrigated; thereby saving the loss hy percolotion in large causls and placing it within the power of a greeter number of cultivators to irrigate sumil areas (for which there would, he a sufficiency of manusolocally) the rayats would be more ready to take advantage of the water in ordinary years.

Further, if a large number of small works with short canals can be constructed the entire local management might be ploosed under the rillage officers and some of the useal heavy establishment charges saved. The conversion of rain crop to irrigated crop load would form an indirect protection, in that the irrigated crop is of greater value than the roin crop, and the not amoont of manoy which is produced by the land is increased. The exact momer in which this increased value is distributed would be a secondary consideration, the main point seems to be that if the value of the crops is increased, the village must be richer as a community and its inhabitants in a better position to maintain themselves during famino.

There would probably be a gradaol tendeacy to increase the irrigated areas us the people begin to recognise the value of a sure and cortain crop of high value in place of the precarious and cheap rain crop.

One possible means by which a large number of small works of the kind outlined above could be constructed, would be by bailding a series of wers on the rivers, the land adjacent to which is generally fit for isrigation.

In rivers with a perennial flow a portion of the dicebarge could be utilised at consecutive illages by the construction af weirs alone, but in order to make such a scheme a success, and to insure protection in famine years, it would be necessary to construct large clorage tanks in the Ghats, from which the quantity of water flowing down the rivers would be augmented. It is necessary to raise the water from its natural channel in the bed of the streem, to near the top of the banks, so that it can be taken off at a convenicat level and distributed over the land. The only means by which this object can be altained, is by the construction of weirs across the streams. It is, however, essential that these weirs should be so designed that during periods of heavy rain, they will open automatically and present no material obstraction to the passage of the maximum discharge of the stream, in order that the flood level may not be taked to any appreciable extent, otherwise the adjacent lands would be submerged and danuged by flood water. So the weir should be constructed of some type of shuice gates.

It is, moreover, necessary that on the cessation of the

It is, moreover, necessary that on the essation of the flued, the slaice gates should close automatically, so as to allow only the diminishing flow to pass the gates, while impounding the water at a nearly constant level above the

With automatic sluice gales acting in this manner the water above the weir is relaised at a nearly constant height, about the level of the top of the sluice gates, and the whole or any part of the discharge of the stream can be directed for irrigation, while the balance of the flow not so used, posses through the sluice gates and flows down the stream.

The antonontic sluice gates illustrated in the drawings at the end of this note set in the monner of ore described, and by their use, the beds of streams can be converted into a series of natural storage reservoirs. While impounding port of the rainfall, which would otherwise run to waste, they canable the percanial flow to be used for irrigation, and allow any balance of water to pass down the salloh. The sluice gates open automatically during heavy rainfall and present no meterial obstruction to the flood discharge of the stream.

With a series of such weirs the rivers which now serve only as water convex for the discharge of the rainfall could be converted into a series of irrigation reservoirs; serving both as the main caunla by which water could he passed down from large storage tanks in the Ghals and distributed by small canals over the orea to be protected, and also forming a series of small reservoirs which would tend to rulse the sub-soil water lovel and improve the supply of neighbouring wells.

The moin objections to the use of automatic slaice gates

(1) Sand or silt may deposit in froat of the gutes and prevent their opening.

Wilb the design appended to this nole—judging from experiments with small gates—an accumulation of 1½ feet of sill against the bottom of n gate 10 feet high will not affect the working of the gates. As most of the pools

formed above the weirs would be 1 to 2 miles long, it is most unlikely, even in rivers with heavy silt-laden water, that this amount would be deposited in one year. As soon as the gates open the silt is at once washed away by the rush of water beneath them—

(2) Trees and floating débris might be carried against the gates and so cause them to jam and prevent their closing.

In relation to this question there are two positions to be considered —

- (a) When the gates are horizontal, passing the ordinary flood discharge, the trees will be caught on an iron bar at the lovel of the F. S. level placed in front of the gates.
- (b) When the river is in exceptionally high floed the water passes olear over the top of the horizontal gates and so the debris would be corried over them.

The nalomatic weirs would prevent the silting up of the streams as in heavy floods during which the gates would be fully open there would be practically no obstruction to the water way, and any silt which had collected above the gates would be swept away, and the river bed would be cleared down to the level of the low ma-onry foundation weir on which the gates are placed.

The sluice gates and their mode of action are described in the accompanying appuadix with statements of cost, etc.

The above proposals may be briefly recapitalated:-

(1) To have a series of automatic weirs on small rivers so as to form a consecutive number of reservoirs from which short canals, which would be managed by the village officials, would distribute the water.

The object of these weirs in the small rivers is-

- (a) To eachly any flow in the river in seasons of drought to be used to prevent the rain crops alying by giving one or two waterings.
- (b) To provide a sories of storage reservoirs, one below the other, thereby mising the sub-soil water and improving the wells.
- (c) To encourage wheat irrigation so that a certain area of otop will be protected permanently for each village over a large area.
- (2) To build automatic weirs in the large rivers such as the Krishnu and Phima on the same principle as proposed for the smaller rivers, but large storage tanks to be built in the Ghats, the water from which will be passed down the rivers and picked up at intervals and distributed by canals.

The Royari canal in the Satara district is the nearest existing appreach to the proposals for small rivers. The canal is 5 miles in length and irrigates 1,200 acres with a net revenue of Rs. 3,645.

The Krishaaa canal also in Satara is somewhat similar to the preposal for large rivers, it larguages 5,000 nores with a not revenue of Rs. 28,974.

### III .- Note on Irrigation on black soil.

As there is considerable variation in the opinions expressed on the possibility and value of irritating black soil, the following suggestion is preposed as a possible reason for the differences of opinion.

The value of black soil for irrigation scems to depend not so mach on the soil itself but on its depth and the underlying strate and also on the amount of water used.

For instance, in deep black soil say 8 foot deep or more as in Surat and Breach or in shallower soil say 8 feet deep bat resting on clay, trap or any impormiable strata, irrigation can be used with great advantage from wells but not from canals.

With an almost unlimited sapply as with canals the cultivators are inclined to use fartee much water, the result being that the land gradually becomes water-logged, or as the Natives say, "cold" owing to the saturation of the lower layers which have no drainage and soon become a mass of cold wet much. Nith well irrigation no more water is put on to the land than is required to mature the crop, as every extra cubic foot of water put on the land means extra labour for the cultivator in raising it from the

With shallow black soil resting on muram or other porous strata the case is different, the excess water from the canal supply soon seaks through the layer of black seil and is carried aff by the porous underlying strata and the land is kept "warm" by the natural drainage, and water-logging is avoided. In the esse of well irrigation only the amennt of water required is put on to the laud and therefore there is no fear of water logging.

- As regards remedies:—Where it is considered advisable to protect deep black soil areas or shellow soil on imperious strats, the only thing to be dene appears to be to regulate very corolly the amount of water passed do we the canal to the actual requirements. If the cultivators at the lead of the canal take toe much water there will not be enough for the cultivators lower down, and when ence the latter recognise that the electrices of water is due to wats on the part of these higher up the canal, they may be trusted to apply their own remedies. No system of drainage would be feasible, the expense would be prohibitative and there would be too much interference with the private rights of individual cultivators.

The less the length of canal the cosicr it would be for the cultivators near the lower end of a canal to prevent waste of water by these higher up. With short canals of say 2 to 3 miles the riliage officials would be able to deal and put sufficient pressure on all offendors.

IV.—Note on the raise of manure and the possibility of its supply for small irrigation works.

There appears to be great difference of opinion as to the necessity of mannre if irrigation is to be made a success. The following is suggested as a possible solution. "Irrigation" is understood in quite different senses by different people. For Instance, under Kharkwasia Canal near Poona the term means high class crops such as suggarcane and garden produce, for such corps not only is it absolutely necessary to manure the land to a high degree but also, in order to be successful, the cultivator must have considerable experience and know how best to grow and rotate the crops.

On the other hand with, "Irrigation," as applied to the protection of districts liable le drought, the term would more correctly be understood as—

- (1) The provision of canal or well water in order to componente for deficient rainfall and so save the min crops in seasons of droughts.
- or (2) The substitution of irrigated orons such as wheat and barley for the rain juari or bajri so as to sayo as large an area aspossible of protected land.

As regards 1.—No more manure than is now used would be required. The crop dying for want of rain can be saved by giving canal water but this would not affect the crop on land in any other way. The substitution of canal water for deficient rule can cause no necessity for extra manure nor can there be any injury to the land as in ordinary years. The crop would have matured by the same amount of rainfall as the water given from the canal.

As regards 2.—The area of permanently irrigated crops will always be limited, but every village has a certain amount of manure, much of which is now wasted but which, with the certainty of a good paying crop, safeguarded frum failure of rain, the cultivators might be laid to use to the benefit of the laud.

The introduction of perennial crops will doubtless be very gradual but the manure question will probably solve itself. The large acreage of sugaronne round Poona and the rates paid there for water show to what advantage high class crops can be grown. If the acreage of sugaronne round Poona is compared with the population and the same percentages applied to any village with good irrigable soil it would appear that when once the cultivators recognise the value of perennial crops they are able to get over the dilliculty about mannre. Of course the chounstances at Poona are exceptional and it is not easy to explain the very high rates up to 12s. 50 per acre that cultivators are willing to pay for water there but it would seem to be to the interest of all concerned to try and make similar conditions in as many villages as possible,

Mr. E. O. Mawson. 20 Dec. 01. Mr. E. O.

Mr. E. O. 1. Q. (The President).—You are Executive Eagineer, Mawson. Pooma District ?—Yes.

- 2. Q. We examined you at Rajkot?—Yes.
- 3. Q. You knew samething about the fumino? —I was in Kathiawar during the last femine. M, provines experience of famice was in Salara in 1896-97; we did not do suything thore besides metal breaking.
- 4. Q. The District was hard hit?—Yes, especially in the ghat district. In 1896 there was too much water and the craps died from too much rain in the west of the district.
- 5. Q. But we heard that the people were perishing far the wast of water ?-Yes, in the eastern parts.
  - 6. Q. Woro you long at Satara ?-12 years.
- 7. Q. What, do you consider, are the wants of the district?—The Western part of the district requires nothing; but the Eastern part which adjains Shalapur is always in a precariaus state.
- 8. Q. Are there no tank works in Smara?—Yes. Mah.wad tank which in the largast irrigates the Shalapar
- Q From your knowledge of the district what is the hest thing in do for Satara?—The only thing is to try and store the water; the slope is rather steep and the water rens off qeickly. This can be done by staraga reservoirs ar dams across rivers like the Krishna. The Krishna Canal irrigries 5,000 to 6,000 acres of land nud it has a woir 20 feet high.
- 10. Q. This is not a storage weir, but only for misiog the ater?—Yes, hat there is a certain amount af starage above
- 11. Q. There is a tauk at Maiai?-Yes, it was made ia the 1876 famine.
- 12. Q That is not dependent on the Ghats?-No.
- 13. Q Do you know why it is not more used?—It is full of water, but the land under command is not very good.
  - 14. Q. Is there a pretty good rainfall there? -Yes.
- 15. Q. (Mr. Muir-Mackenzie).—If it fills, why does it not pay?—The land is not good and the establianment charges are heavy.
- 16. Q. You have gut to keep na Overseer or Assistant Engineer and their wages are charged to the tank because there is nothing else to charge it to ?—Yes.
- 17. Q. But they also have charge of the reads f-Bat the larger proportion is charged to the tanks.
- 18. Q. (Mr. Ibbetson).—With the result that they do not produce rovenne?—The establishment and repair charges swallow up the revenue.
- 19. Q. (Mr. Muir-Mackenzie).—You do get revenue out of the tank?—Na, not when interest an the capital cost is taken into consideration in addition to estallish-
- 20. Q. (Mr. Ibbeteen.)—Yaa seem to look upon it as un accepted principle that all the establishment charges should be charged to the tank. Is it a rule of which the principle has been laid down by Government?—I think it is a genorally accepted rule to charge as much as possible to tank. The tank is Imperial and the reads are Provincial.
- 21. Q (The President).—What is you advice about tanks ?—I would suggest the building of more weirs, they do not salt up like storage tanks. The Krishna Canal pays fairly well.
- 22. Q. How much land can you irrigate from it? About 5,000 acres.
- 23. Q. Will it stand mare extension?-Nearly all the water is used up, we cannot extend the irrigated area much more.
- 24. Q. Are there no small rivers in the viciaity which you sould draw upon?—I think a storage tank or two could be made.
- 25. Q (Mr. Rajaratus Mdlr.).—On some of these works, the warking expenses are much higher than the revenue. On the Upper Man river, the working expenses are Rs. 6,600 and the revenue only Rs. 5,000. We cannot get to the battam of this, can you explain it?—It is chiefly due to the fact that most of the establishment charges go to

- 26. Q. Can you not reduce the establishment ?-I don't think eo.
- 27. Q. (Mr. A the district ?-No, Muir Mackenzie). - Not in the whole of
- 28. Q. (Mr. Rajaratna Malr).—I netice that three out of the five works do net pay their expenses?—Those are pratective works.
- 20. Q. Could they not be made pradactive?—It is diffi-ault to deal with the peaple in the Decean. They will not take water as long as they can got a good rainfall, while you have to keep up your canal establishmeat always in good years and bad.
- 30. Q. Is much sogar-ane irrigated under these works ? -No, very little.
- 31. Q. In the Royarl canal tha total area is sugarcase? That is because it is close to Satara which is a large town and there is pleuty of manure there.
- 32 Q. (The President).—What about the Yerla project mentioned in Mr. Bealo's repart at page 251?—I caunot give you any information.
- S3. Q. Are there mony wells on these canals to supplement the irrigation ?—No.
- 34. Q. (Mr. Muir-Mackenzie).—You are submitting, I understand, a momorandue an Decean irrigation. You suggest that bunds should be made where you have perennial supplies in the rivers?—Yes, I think this would be advis-
- 35. Q. They would not do as famiae warks?-No, then construction requires skilled labour.
- 30. Q. I expect that you could get the canal dane with famine labour! -Yes, the enough, but not the weirs.
- 37. Q. Would there be no difficulty where the rivers run rary deep?—No, in the Deceau District we might have 20 and 25 feet dams; the dam in the Kistna is 31 to 25 feet high.
- 33. Q. Is there no form of irrigation work you can propose as famine labour for extending or conserving the water supply. Say the termeing of the country with tals? The Decean is not suitable for tals.
- 39. Q. You found tanks a very good kind of work in Kathiawar, why not in the Decean? The general slope of the ground is mach greater in the Decean than in Katlinar, and the conditions are not so favourable.
- 40. Q. Wore you quite satisfied, with the form of famine labour you did in Satara district ?-I do not like melal
- 41. Q. What would you prefer to see deno P-I would prefer anything to metal breaking.
- 42. Q. Is it difficult to break metal for road making? Yes, the people's hands take fourteen days to got hardened and the metal must be collected in large heaps cutailing extra cost for entringe.
- 43. Q. What better work is there for them to da F-I would rather see them tarrasing the concern, .
- 44. Q. (The President).—Do the land-ewoors readily consent to this?—I think they would.
- 45. Q. (Mr. Muir-Mackenzie) .- Would you put the 45. Q. (Mr. Muir-Mackenzie).—Would you put the famine labourers on tanks?—Yes, if we could get good sites and the projects were already prepared. There were oo projects prepared for Satsra. You see the preparation of prajects is rather an expensive item and to keep u programme ready requires a lairly big grant for survey alone.
- 46. Q. How much woold it require for the whole Presidency?—Mare than three lakhs a year for three or four
- 47. Q. (Mr. Ibbetsen).—Both you and Mr. Kemball, have spoken of motal breaking as n had test of destitution, what ie the objection to it. That the people do not like it, makes it one af the best tests pessible?—It is almost impossible to get correct measurement. I think the Overseers alwars over-measure; they give oredit for more than is really done. This is not the case with earthworks, which can be measured up in large quantities. The measurements for metal are of necessity for small ameasts per worker, compared with earthwork, so that the oxness per worker, compared with carthwork, so that the excess measurement is cumulative. Earthworks are always easier te check.

# WITNESS No. 58 .- MR. DAJI HABI RENAVIEAR, District Agricultural Inspector, Poona.

- 1. Q. (The President) .- You are District Agricultural Inspector, Poons ?-Yee.
- 2. Q. How long have you been in your present post ?-About 18 mouths.
- S. Q. Please give mo your viows about the irrigation of black cotton soil?—It can be irrigated, but the question is whether rice orops can be grown on it. Some cultivators think it can he, but the only difficulty is that it takes a great deal of water.
- 4. Q. There are many kinds of black soil. We have heard of some in Guzant that will not take irrigation f—In the 'wona district the black cotton coil is not too deep for irrigation and is not widely oracked and can be irrigated. I speak of well irrigation.
- 5. Q. Is it the custom here to irrigate the black cotton soil from rells?—Watered from the wells the crops yielded are good.
- 6. Q. Would it not bo the same on the Nira and Mntha Cauals; is there any difference in the water that comes from the cauals and that which comes from the wills! - The agriculturists say that well water is more nutritious.
- 7. Q. There is no objection to tank irrigation ?-No. The ennal water is said to be cold. The fact is that the people over-flood their fields, and the result is injurious.
- 8 Q. If wells are dug close together, do they injure each other? —If two or more wells are dug in the same subsoil current there is some risk that the first well will run dry.
- 9. Q. How far apart should wells in your opinion be?-In one aere you may have two or three wolls without injury to each other. In Mohail in the Nasik district I know a place where in an aere of land there were three wells.
- 10. Q. Were these wells worked in the season of drought without injust to each other?—Yes, but they had to be deepened. It is usual to dig deeper in famine years. In Poona the water surface has gone down 7 or 8 feet during the past few years.

- 11. Q. Would agriculturists be glad if they were given Mr. Rena-the use of hering teels?—They would not be able to work rivar.
- 12. Q. Do the people understand the advantages of takari?—Yes, but it is hard to get the village Kulkarni to do anything naless he is on good terms with them.
- 13. Q. Could you snggest anything that would make the system casier?—There is a great interval between the time of application and the time of the grant. If the work is entrasted to Manlatdars it would be done more quickly and there would be no trouble.
- 14. Q. Is there any complaint against the 5 per cent. interest charged by Government?—No, the rate is cheaper than the rate which Marwaris charge, which is 18 to 24
- 15. Q. (Mr. Rajaratna Mdlr.)—What are your duties as Agricultuml Inspector!—I have to check the work of my subordinates in the disposition of boundaries. I teet the inspection of crops in the booke furnished, and eoe that tho net area of crops as given is correct.
- 16. Q. Do you measure the area of orop under each well? The Circle Inspectors take tests.
- 17. Q. Are there cases in which the same aren is cropped more than once in the season ?-Yes.
- 18. Q. In your crop return do you show that aron twice or once?—If two neres are under bajri and it is changed for juari, we show only two acres, but in the remark column we show two crops.
- 19. Q. (Mr. Muir-Mackenzie.)—You show the acres cropped and the net crop area?—Yes.
- 20 Q. The acres cropped would be four and the net crop area two?—Yes.
- 21. Q.—What is the cost of an ordinary well?—An ordinary well costs about Rs. 300; a good deal depends on the depth at which water is found.

## TWENTY-FIFTH DAY.

## Poona, 21st December 1901.

WITNESS No. 50 .- MR. E. L. CAPPEL, Collector of Poons.

Memo. by wilness.

I have just returned from the revenue inspection of Indapur and Barameti talukas which are served by the Nira Canal. It was not intended that I should give evidence before the Commission, and I have, therefore, not got figures and details, and can speak only to the general results observed.

## CARAL IRRIGATION.

- 2. General Results .- The irrigated villages paid the greator part of their revonue during the famine, and oupgreater part of their revenue during the famme, and sup-ported great numbers of laboarem from outsule. The rise in prices naturally brought very large profite to holders of irrigated lands. These villages show romarkable indica-tions of prosperity, in m improved etylo of building and in the condition of stock, as well as in the appearance of the people and in the general presence of oil and engar crushing muchinery. Irrigation by cannot not present rates is certainly much cheaper than irrigation by well, and wells in the cannot commanded area are in fact not used, though full of water.
- 3. Instances of individual prosperity may be given. A large landholder who was in debt to the extent of about largo landholder who was in debt to the extent of about a lakh a few years ago, has now paid off all but about 10,000, although during the famine he has got nothing from his lands in another district which form the larger portion of his property. Another large landholder bought land when the canal was under construction. Ho bought land when the canal was under construction. He was a Kulkarni by profession and is now one of the rich men of the district. A very noticeable instance of the general result is the increase of the population and wealth of Baramati town. The population of the town is now 9,400, and in 1891 was only 5,100. In this town there is no crime of any kind and very little clearliers on the canal, although a considerable number of "Takaris"

and other eriminal tribes are located in this tract. The condition of Indapor lown offers n etriking contrast. It may not be very criminal, but is certainly not from from orine, and the general appearance of the place is one of 21 Dec. 01. It has decreased in population, and poverty is everywhere apparent.

4. Drawbacks.—The each irrigation appears to have the following drawbacks: it occasionally produces ealt efflorescence, and there is an approbension that it may exhaust the land owing to deficiency of manure. I have seen a good many patches of salt land, but not large in area, and this evil events so far not to have done much damage. It is probably due to inexperience in the use of the water. The exhaustion of the land is morely articipated and here The exhaustion of the land is morely anticipated and has not shown itself on any aren I have seen. I believe this foar arises from experience gained on the Mutha Caual where a good deal of land has in places become unfit for uso. But I think in these casees also abuse of the water was the cause, as I have generally heard a history of excessive scakage in connection with such hand. Of the water-logging of any extensive tract I have never heard in these parts. I believe that those are minor difficulties and can easily be overcome by experience.

5. Manure—The supply of manure is, of course, an important factor. There is at present come deficiency. Balamaticake is imported from Gujarst, night-coil is used to a small extent, and all kinds of expedients are recorted to. Earth from village site is used and croble manure was brought is from unirigated villages daring the famine, which will probably new cease to be available. I have not heard of "San" being plaughed in the Southern talakas, but I have seen it grown as a green crop manure for well irrigation in Khed or Junnar. I see no reuson to suppose that the prosent deficiency will not be remedied in course of time, or

28 Oct. 01.

Mr. E. L.

Mr. E. L. the use of water will be limited as experience shows the proportion to be used with the manure available. Much of the irrigated area is rich black soil which is unturally very 21 Dec. 01. fertile. At Baramati itself the Municipality is arranging for a latriae system and the cystom of drainage specially calculated to produce large quantities of night-volland drainage manure, which is expected not only to beach the load, but to bring in a handsome profit.

- 6. Irrigation works as employment for famine labour.

  —Irrigation works appear to me to be by far the hest application of funian labour. The Shetphal energy tank for instance will, I believe, change the face of a large area of poverty-stricken country sooth of Indeput, and the labour expended upon it will be a permanent benefit to the people and a seferant point funiant forming instruction in the post warth. and a safeguard against famine just where it is most wanted. The making of roads has been overdone in this district. I The making of roads has been overdone in this district have just travelled upon a road (Baramati to Patas) made during one of the recent famines at great cost, which is hardly possible now for bullock earts in places. The District Local Board has not endiciont funds to maintoin any more roads and cannot keep up those it has theads produced more roads and cannot keep up those it has Iteads produced no return, except in a very romote way, while may tank or canal which brings water on to land at least ensures rovenue and provides labour for outsidere over a large area than that actually common ied. These items alone appear to me to make a strict calculation of direct profit and less on irrigation works out of place. The indirect gain to the country can hardly be eleviated. For lastance, setting aside the great value of the produce under high cultivation and the first that in bud cersons nothing at all would be grawn, there romains the circumstances that allows tall canal irrithere remains the circumstances that almost all canal irrigated land in these ports is made to produce three crops instead of one, year in and year ont.
- 7. Wells.—The question of wells is a very difficult one in the Decean. In Posna an engraceas amount of money (both tagai and private) has been lost owing to the digging

- of dry wells. I have not formed a decided opinion as to why this is. The digging of trial pits is rarely resorted to, and the offer of Government to meet the cost, if water was not found, has not heen pat to use. There is a general impression that the water level in the cost of the district is sinking owing to continuous deficiency of rainfall, and nadoobtedly many wells which held good water when built are now dry or nearly so all the year round. In Indapur, Dhend and Bhlmthadi, the Local Officere disapprove of the use of tagai for wells at prescot, owing to the extreme difficulty of fluding water. I think that borlag machines might be used with adrantage: but this is rather an engineering question, as horing through the Decean trap might cost more than making a trial pit. If it costs less I would lead the machine for nething it water is not found, and would make only a small charge if water is reached. and would make only a small charge if water is reached. Boring in this way might be continued with a wide extension of the tagai system as there would be no hesitation oboat the well with water well ascertained.
- 8. Tagai.—The issue of tagai for wells and otherwise might be improved by the abolition of notice to call for objections, which seems to be unnecessor, and by the empowering of Mamlatdars as was done in the recent famine. And I think that if expedition and regularity in the disposal of tagai basiness is to be obtained, the establishment should be permauently increased. All per cent. increase in the interest rate would cover this and would not be felt as n hardship. Anyhow the fact must be foeed that a large agricultural banking business each as this cannot he imposed upon the ordinary Taluka establishment.
- 9. Dams and Tuls.—There is no room in the eastern part of Pooua for much protection by means of dams and tals owing to the small number of streams, the nature of the country and deficient rainfall. Work of this kind is largely carried out in the Western Division, but this division is not ordinarily exposed to familie.
- 1. Q. (The President.)—How long have you been Collector of Poons?—For vix months. Before that, I was in Dharwar and Balgaum. I have been here in Poons before as an Assukant Collector and as Director of Agriculture. I koow the eastern part of the district very well.
- 2. Q. Have you been there recently F-Xes, I have just returned from the Revenue inepection of the Indapar and baramett talakas which are coved by the Nira canal. I was much strack with what I saw there
- 3. Q. You odyance the novel suggestion that irrigation prevents erime; it is the first time that we have heard this advanced as one of the benefits of irrigation?—Yes, in Baramatu there is no crime of any kind and very little elsewhere on the caual, although a considerable mucher of Takaris and other crimioni tribes are located in that tract. The caudition of Indapur town offers a striking contrast; it may nut be very oriminal, but it is certainly not free from erime and the general appearance of the place is one of decay. It has decreased in population, and poverty is everywhere apparent.
- 4. Q. Is it close to the canal ?-It lies outside of the irrigation area. It is north of the Shetphal tank.
- 5. Q. If more water could go down the causal to Indapar, would the town come ander the inflaence of it? —I don't know. Indapar is a town of only 3,000 souls; it is a decaying place.
- 6. Q. The canale occasionally produce selt efferescence. Hove you heard methods discussed for getting rid of it?—Yee, it is considered beet to let the land lie waste for a few years. So far as can be ascertained sait offlore-scence is olways associated with too much sonkage. If the land is left alone for three or four years and theu irrigated lightly, the salt goes out of it.
- 7. Q. You have seen the salt plains of the Punjab !- Yes, we have nothing like that here, only a field or two at a time is affected.
- 8. Q. Have you tried draining the affected loud?—The conditions are very different here to the Punjah and it is not thought necessary. The question of drainage hardly applies here.
- 9. Q. You allude to the supply of manner being delicient in Balamati, is fish macure used to any large extent?-I had not heard of it until I read an account of Mr. Molhion's evidence; I have no doubt that it is used.
- 10. Q. Have you seen much artificial manare used P-Yes, they use oil cake and night-soil, which they prepare. All kinds of expedients are resorted to to obtain manure.

- 11. Q. (Mr. Muir Mackenzie.)—Are the people using safflower ?—I have not seen it used.
- 12. Q. Karan coke?—They may use it for manure, but I know they give it to cattle.
- 13. Q. (The President).—You say that a lot of money, both takivi and private; has been lost in digging wells whore there was no water. le it true that the local which there was no water. It is the that the local colliders hove gono so far as to say no more takey will be granted?—The water level as the district is sinking and the rayats cannot be induced to dig triol pite. They all put their moasy on the opiulons of native exports, or the local wizard.
- 14. Q. You say that the abelitive of notices calling for objections should be done away with; what notices are those?—A notice calling for any objections against the making of a proposed well; as the land is charged with the improvement.
- 15 Q. In the case of a well, the charge is small and the improvement in the land paye for it?—The netice refers to wells on private property.
- 16. Q. You saggest that the establishment should be iacronsed so as to have separate takayi officers, and that the interest charged by Government chould be increased by I per cent. to cover the cost?-I throw that out only as a suggestion ..
- 17. Q. But there are no facilities for the increase of kavi?—I think the abolition of the notice and nu increase of establishment would improve matters.
- 18. Q. We were told by a large number of witnesses that if advances were made free of interest, and if the existence of water were first accertained by making a trial borner it would etimulate well construction?—I think that the conditions of this district are hardly such as to ensure this. Tokavi would be taken by the rayats, but it is doubten what the results would be to Government. I think that if Government is to give the money free of interest, there chould be some guarantee. If Government can find water, the grants might be given more freely. 18. Q. We were told by a large number of witnesses that
- 19. Q. You recommend boring machines?—Yes, boring machines might be used with advantage, but that is rather an oagineering question, as boring through the Decommend trap might cost more than making a trial pit. If it costs less I would lead the machine for nothing it water is not fuund, and for oaly a nouinal charge if water is recohed.
- 20. Q. (Mr. Muir Muckenzie)—But you would require a large number of machines?—Yes, but we could commence with one apparatus first and obtain more if the tial proves successful.

- 21. Q. (The President.) What course would you advise as the best to adopt to make the district able to withstand sucther famine?—An increase of canals like the Niramost decidedly, and irrigation tanks; but tank facilities are I think, exhausted. If they are not exhausted, I would recommed them in preference to canals. recommend them in preference to canals.
- 22. Q. You recommend the extension and increase of canals similar to the Nira, the sapply of which is sure to be restricted?—I do not know what the engineering possibilities are. I know the Bhemb nover ruas dry. It is entirely a professional question.
- 23. Q. (Mr. Higham.) With regard to dams in the Western part, are they made by the people?—Yes, a good many in the Western part, but there are very few in the Eastern portion. They are of masonry built on rock - beds.
- 24. Q. Is there scope for more works of that kind in that part of the district?—That part of the district is generally free from famine, but it was touched by it this time.
- 25. Q. I suppose it is a district of good rainfall ?-
- 26. Q. (Ur. Ribelson.) You say that the effect of Gor-ernment to make trial pits has not been taken advantage of; was the offer made known to the people?—You, the offer was made known. But it is not the custom of the people to dig trial pits. They prefer to go on the information they get from native, experts and risk their money on it. I do not know of a single case in which the offer was accepted.
- 27. Q. If Government dug the trial pits, would they take lakavi P-I think the idea of the trial pit is foreign to the people bero; they might learn it in time.
- 28. Q. Is there no way to shorten that time?—They are nawilling to spend even Rs. 100 in trial pits.
- 20. Q. But suppose Government lent the money, and the risk was not theirs?—They would not object to that.
- 30. Q. If the offer to dig for nothing was made, would the people take taken if water is found?—The offer was made, but I have not heard of a single instance in which it was accepted.
- 81. Q. (Mr. Muir-Mackenzie.) You know the Dharwar District well; you have a considerable system of tank there?—Yes, in the south-eastern part of the districts, that part of the district is not affected by sourcity ordinarily. I do not know if it was affected in 1890.
- 32. Q. It was pretty soverely affected in 1876?—Yes, but escaped in 1899, but we had to spend three lakhs of Local Fund moneys in the north-castera part on fomine.
- 33. Q. Would you like to see the system of tanks extended?—I think they would be very useful for all kinds of crops; they are of the greatest value in irrigating garden
- 31. Q. Are they used for rice crops?—Yes, the people do trigate rice crops from them in Hingeli and the Ghat districts on the western boundary.,
- 35. Q. Were these tanks considerably out of repair when you saw them?—Yes, a great many wers. It would be a good thing to put them in repair as soon as possible. The expenditure would repay itself.
- 36. Q. (Mr. Ibbetson.) How?—In improved offi-ciency; they now lose a great deal of water. It would give the rayats more water, and an increased area would be brought under cultivation.
- 37. Q. Government has now to remit revenue on land which has gone out of onlivation in that district ?- Yes, but I cannot say the amount.
- 38. Q. Is the amount remitted very large?—The amount remitted at the present moment is not large.
  - 39. Q. Do you think that the extension of tanks in Dharwar might be facillated if they were given over to the Local Boards with the additional revenues due to the water? I am not inclined to think that that would be a good was of managing them. I do not consider the Local Boards, the best agonoy for carrying out work of that kind.
  - 40. Q. Do you mean that it should be done by the Public Works Department ?-Yos, it would be better done by thom.

- There is a tendency for Local Boards to place their works in the hands of the Public Works Department.

  \*\*Cappel.\*\*
- 41. Q. You don't think it would be sufficient if the 21 Dec. 01.
  Public Works Department prepared the plans and the Local
  Beards carried them out?—I would prefer not to see that
- . 42. Q. Supposing the Public Works Department executed them under the Local Boards, would the Local Boards want to be satisfied as to the revenue they would get ? What interest would they get?—Most of the Local Boards have no money; the Dharrent Local Board has no funds; all its finds were appared in the last famine funds; all its funds were exhausted in the last famine.
- 48. Q. With regard to takevi, would you like to scelthe number of instalments increased?—No, I think the number is already large enough.
- 44. Q. Would you have the instalment: running up to 20 years with facilities for extension?—I do not think there is any necessity for an increase.
- 45. Q. We hear that one of the objections to taken is the rigidity of the collection?—We could give facilities for extension of the payment of instalments.
- 46. Q. But why not do away with the instalments altogether?—There is no reason except that Government runs a certain risk and capital is looked up for a much longer timo.
- 47. Q. Would the rayat in that ease ever ropay the money !-- I was just going to say that he might not.
- 48. Q. (Mr. Muir-Mackenzie.) Why should he over ropay it if Government can find the money ?—That is a question for Government to consider.
- 49. Q. Suppose we go so far as to say that Government should find the money and the rayst pay only the interest, but that we should allow the rayst to repay some part of the capital whenever he cared to do so?—I would like to see that tried, but at first experiments would be necessary. Supposing a dry orop rate is Rs. 2. and you boild a well for Rs. 400 from taken and irrigate two acres, and you charge a water rate of Rs. 2 per acre, the income would only be Rs. 4 per annum for the Rs. 400.
- 50. Q. Don't you think two acres a very modest estimate?—No, not in the Eastern Decem. I think two acros is a fair average. A very good well might run to three acres.
- 51. Q. The number of acres taking the net cropped area is over three acres?—Yes, in the western district, but only two in the eastern. Our pathashal rate is its. 8, but we could not expect more than half of that.
- 52. Q. If you give a man n loan, he will have to pay Rs. 5 per cent. interest; in the same way I don't see why you should not take Rs. 20 from him on the Rs. 400 advanced?—I think the idea an excellent one, and I would like to see it tried. We could find agriculturists here and there who would be willing to do this at once. It is quite a new principle to me, but I think they would take the last out these terms. the loan on those terms.
- 53. Q. How long do wells last in this district ?—They last for ever it the water insts where the bottom is solid rook.
- 54. Q. In your experience have you over had any diffior the moon the full amount allotted for taken? Properties to the moont might be increased. It depends very much on the interest taken by individual officers. The Assistant Collector and the Manulatdar could is no an enormously large amount of taken. I the Mamlatdars should be given more power and more time. I should like to see them with more power to advance. I think they could be trusted to rise, to their responsibilities. rise to their responsibilities.
- 55. Q. How far would you go? -I would give them the same power that they had during the famine; that is of granting loans up to Rs. 500. I think the thing is too large for European Agency; oven the Assistant Collector must roly on the Mamlatdar, who, I think, could generally be trusted.
- 56. Q. I am afraid the Mamlatdars have not always come up to the scralch; have there not been some cases of grave suspicion ?-Yes, that is so.

## WITHESS No. 60 .- SARDAR COOP DOSWAMT MUDLIAR, of POODS.

#### Extract from Memorandum by Witness.

Sirdar Coopeoswamy Mudliar.

Oil engines with numps attached are considered very occasional and useful for agricultural purposes. They are attended with no danger, and do not require the services of an expert to work them, as to the case with steam power. I have only lately put up an oil engine with a centrifugal pump by blesses. Tangyer, of Birmingham, in my farm at Hadapsar. It is capable of irrighting about 4 acres per day

- of 8 hoors, the cost of oil daily used being about Ro. 4. I have not had sollicient trial and experience of the engine to say anything with certainty, but I have hopes that it will work satisfactorily. In connection with this I have received cordial advice and assistance from the Executive Engineer for Irrigation, who is watching even now with interest the progress I ma making with my ougles.
- 1. Q. (Mr. Muir-Mackenzie.) You own a considerable amount of land in this neighbourhood?—Yes, 100 acres.
- 3. Q. What would you say is the ordinary cost of a well, 30 feet deep, in tolorably good soil?—Much depends on how soon you reach the supply of water.
- 4. Q. For a well that would supply one mot with no tran for 15 or 25 feet?—About Rs. 250.
- 5. Q. Is that not rather cheap?—No, the rayat would not build it strongly, but simply sufficiently well to serve his purpose. There are plenty of such wells which do not cost more than Rs. 250; only a portion of these wells are built op with massory. With olight repairs they last more than 30 years.
- 6. Q. You menn ouch repairs as the rayat can do himself?—No, the carpenter and the bricklayer would have to be requisitioned.
- 7. Q. What interest has the rayat to pay to the sowear?
  —It varies from 15 to 20 per cent. per nunum. Seldom less than 16 per cent., oven if the applicant is perfectly solvent.
- solvent.

  8. Q. Would you be glad to see the interest of 6 per cent. charged by Government, lowered?—No; it is low enough, but the people ore reluctant to take takavi. They would be glad, if the loan were given with certain assurances. They are afraid of borrowing from Government, us the State has great power over their lands. They prefer the sowcar, who is somewhat lax in the recovery of instalments. They do not expect postponements of instalments from the Government. They have difficultles in regard to payment at times, and they find the banis mure lement than Government, though he does charge heavy interest.
- 9. Q. Supposing the Government took only interest with no instalments of capital?—That would be a great relief. I do not think it would have the effect of making the mynt never pay back anything.
- 10. Q. Would it be necessary for Government to lower the 5 per cent. ?—No, it is quite reasonable.
- 11. Q. Yoo have seen a good deal of the Mutha Canal irrigation. Is it doing damage to the soil?—It generally does good; it is not the use but the nines of the water that does herm. The people over-water. When they use too much water, they have to put in a large amount of manore. It does not water-leg the soil, it it is pidiciously applied.
- 12 Q. Would drainage be a remoly for miler-legging?

  -Yes, I know a water-legged garden at Wadg on which
  was sold by the Irrigation Department and improved later
  by drainage, and is now a valuable property.
- 13 Q. Does oalt officereence result from over irrigation or from the character of the canals?—From too much irrigation.
- 14. Q. Do you think that the Canal Department con prevent the excessive use?—I think so. It would stop the cultivotor from taking water if certain restrictions were sade. If the restrictions are reasonable, they will prove beneficial.
- 15. Q. Can you tell us to what extent artificial manares are used on this side?—To a great extent, fish and oll cakes from Gujarat.
- 16. Q. Are they not using Karanj cake?—I do not know; no cultivators in my neighbourhood have adopted it to my knowledge.
- 17. Q. Do you think, if canal irrigation is largely extended, manure in sufficient quantities would be fortheoming?—Yes.
- 18. Q. Have you known any instances of villages at come distance from Poona where night-soil is being osed?

  —I know only one or two instances. It is not general.
- 19. Q. (The Precident.) You recommend in your note that Government should go to the cost of digging wells; would you charge assessment on the wells?—I would not put it on for a certain number of years at the beginning, but I would charge it later.

- 20. Q. Do you think that Government should put up oil engines and pumps?—It would sepay the cost, the daily expense of working 10 HP engine with a five-inch pump capable of irrigating 4 seres a day is only 84
- 21. Q. Why should not the myat do it and not Government?-The rayat has au mouer,
- 22. Q. (Mr. Rajarotna Mudoliyor.) You say all cogines and pumps chould be put up by Government?—Yes, to lift water from rivers or ennals to lands higher than the anni lavel.
- 23. Q. About the abuse of canal water, the you think that the rayat is ignerant of the fact that over-irrigation causes dannage?—They might have a hutle knowledge, but the work is left to servants, and they are careless. They let the whole field fill up, and make no use of the distributing beds. The canal rules are thus frustrated.
- 24. Q. (Mr. Ibbetson.) It would mean more labour to lead the water from one bed to another?—Yes, they now allow the little beds to overflow.
- 25. Q. (Mr. Muir-Mackenzie.) They don't get water when they want it, and when they get it, they take all they can?—Yes, it is due also to the uncertainty of supply.
- 26 Q. (Mr. Rajaratna Mudaliyor.) You propose feeding the existing works with canal water f—Yes, the rayans would pay, but what is wanted is that they should be deg by Government.
- 27. Q. Would Government be able to recoup itself by lerving a water rate?—Yes.
- 28. Q. Do you think that application for water should be dispensed with ?—No.
- 20. Q. You apply for water for one season, why not apply for it for so many years?—, think it would be a good pan, but there is an uncertainty of water-apply.
- 30. Q. Is there much delay in getting senction for applications for water?—No, only in difficult cases, which have to be reserved for the consideration of the higher authorities. Ordinarily, it takes about a month. In urgent cases, n pass is issued by the empercisor. The regular sonction of the Executive Engineer takes a month, but the pass can be obtained in alr days.
- 31. Q. (Mr. Muir-Markensie.) Do you think the pass might be issued by an officer not so high as the Executive Lugineer?—Yes, I don't think any harm would result from that.
- 32. Q. (Mr. Rajarstnu Mudaliyar.) Do yon know whether the rayuts are in feavof enhanced accessment, if they dig wells?—Yes, they are always opprehensive, when they change a dry crop to a higher class crup.
- 33. Q. Is there not a rule prohibiting the raising of astersment on account of improvements?—Yes, but the rayato are not aware of it.
- 34. Q. (Mr. Ithetson) Have you ever taken canal water for your rabi crops?—Yes. I always have to lift my water. The count does not rome up to my land.
- 35. Q. Do you make your men take the water always or do you wait for the rainfall? I always take the water: I never depend on the rainfall. When the ordinary cultivator sees that there are no rains, then be takes the canal water.
- 36. Q. (Mr. Muir-Maskenzie) Do you get a superior crop by your method?—Yes, I increase the yield by one-fourth.
- 37. Q. Perhaps halff-Yes, it might improve by half.
- 33. Q. Do others do as you do !—These facilities cannot be had, unless the canal is close by, and, again, those who cannot afford to lift the water or my for it must depend on the rainfoll.
- SP. Q. (Mr. Ibbeteon.)—On what soil do you grow crops?—Two-thirds is black cotton soil; the rest mixed. I have irrigated rabi crops in deep black cotton soil.
- 40. Q. How deep P.—The depth is three feet, and lower down there is loose morom.
- 41. Q. Supposing the cultivator naited in the hope of rain in October, huw long would it take for him to get

conal water, if he weited till the lost moment?—It depends on the amount of water there is in the canal. If there is plenty of water, he would get it in 10 or 14 days. If the water is short, he might not get it at ali.

- 42. Q. Then he might lose his whole crop?—Yes, they do suffer in that way sometimes.
- 48. Q. (Mr. Muir-Alackensic.) What is the average area which a well, costing Rs. 250, will irrigate P.—It wills with one mot, irrigate 8 or 4 acres of ordinary crops.
- 44. Q. What work does your pump do?—The lift of my engine is 30 feet (9 feet suction; 21 feet delivery).

nse it to irrigate all my land. The source of the sumply is the canel water, which I collect in a tank. The total area irrigated by it is 20 ecros.

45. Q. Do you use it for bajri?—Yes, when the monsoon is lote.

46. Q. (Mudaliya Rajaratna Mdlr.)—What water rate do you pay?—I pay half rates, because I lift my own water.

47. Q. (Mr. Ibbelson.) What did your engine and pump cost?—It cost me Rt. 2,400, including erection, and the building cost Rs. 700 more.

WITHES No. 61 .- Hon'ble Me. J. Tate, Chief Engineer and Secretary, Public Works Department, Bombay.

Witness said: I lay on the table before the Irrigation Commission two notes—one on the subject of the Provisicalization of Irrigation Works in this Presidency, and another regarding the Provincialization of the establishment employed in certain districts. They are accompanied by copies of important letters and orders on the subjects referred to. Neither of these matters has been under the consideration of the Government of Rombay since I because Secretary; but I am prepared to give such further explanations as the Commission may require.

The wilness then read the following note on the question of Provincialization of Bombay Irrigation Works:

Between May 1884, when the Government of India anddressed this Government on the subject, and March 1896 there was some discussion as to the Provincialization of Irrigation Works in Sind on which no final decision was come to, as the question merged in the more general one raised by the Government of India in their letter No. 1013, dated 29th May 1856. This was received in this Department with Financial Department endorsement No. 1772, dated 21st June 1896. While this was under consideration, the "Finance Committee" prepared a note on the subject of Provincialization of Irrigation, and this was sent to this Department with Financial Department No. 311 P., dated 21st October 1896. It appears from letter No. 4347-5, dated 10th October 1896, from the Government of India, paragraph 4, that this Government in the Financial Department addressed their letters Nos. 3667 and 8603, dated 36d Decomber 1886, in which disinclination was expressed to entertain the proposals for provincialization of both major and minor works, and therefore the question was allowed to drop.

In 1896 the Government of India again in their letter above quoted revived it with reference to works in the Decean and Gujarat only, and offered certain terms. The Superintending Engineers were asked to submit forecasts of revenue and expenditure, a note was proposed in the Public Works Department, and eventually this Government in the Financial Department addressed the Government of India in letter No. 907, dated 26th February 1893, and they replied in their letter No. 1705-A., dated 16th April 1895, that they had an present intention of provincializing the Irrigation Works in the Decean and Gujarat.

Accompaniments to above note:-

(1) Letter from the Officiating Under Secretary to the Government of India, Department of Finance and Commerce, to the Chief Secretary to the Government of Bombay, No. 1048, dated 28th May 1886.

In continuation of the letter from the Public Works Dopartment, No. 631, dated the 5th March 1836, I am directed to inform the Government of Bombay that the financial failure of the Lower Panjhra River Works has been noticed by the Secretary of State in the following terms:—

"The history of this project is unfortunately only one of a harra number of records

\* Kadva River Works.

Lath Canal.

Janvis Canal.

Matha Cauxi.

Ekruk Tank.

\* A large number of records of the financial failure of Irrigation Works\* under taken by the Bambay Government in the Decom.

and it leads me to request that your Government should consider whether it may not be possible and desirable to relieve the general revenues from the charges that arise from the interest on the approductive capitat on works of this description, and debit them against the Provincial revenues of Somboy. In no other manner does it appears to me to be possible to bring home the responsibility which attaches to the advocacy of the outlay of borrowed funds on works which wholly fail to produce the returns which alone would justify such expenditure."

2. The Gavernor General in Council has had under consideration these remarks of the Secretary of State, and is of opinion that it would be advantageous alike to the Imperial and Provincial Governments if, at any rate, all the Irrigation Works in Bombay which here been classed as Productive were made Provincial. The Provincialization might take effect from the 1st April 1887. The Local Government would pay interest at 4 per cent. on all Capital ootlay up to that dute, this payment being taken into consideration in fixing the terms of the new Provincial contract. On all Capital outley from 1st April 1837 the Local Government would pay interest on the usual terms, namely, at the rate of 4 per cent. a year on the whole past outlay and half the ontley of the year. The receipts from all the canels transferred would be wholly Provincial, and the increase of the receipts from those canels would be a set-off against the interest payments.

3. I am directed to request that you will be good enough to submit the proposal to His Excellency the Governor in Conneil, and furnish the Government of India with His Excellency's views on the subject with as little delay as the circumstances will permit.

4. I am also directed to invite attention to my letter No. 883, dated the 9th May 1884, and to request the favour of nu early reply thereto, regarding the provincialization of the Irrigotion Works in Sind.

(2) Resolution of the Government of India, Finance and Commerce Department (Accounts and Finance-Provincial Finance), No. 3654, dated 14th October 1886.

Note by the Finance Committee on the Provincialization of Irrigation (with special application to the Punjab).

The present Provincial contracts have nothing intermediate between full acceptance of Provincial responsibility for an irrigation work and its being loft entirely apon the Imperial account. The consequence is that, as an irrigation work can never be expected to be enything but a source of expenditure for some years after it is commenced, the Provincial Governments, if they undertake the construction at all, do so only on Imperial account, and have not the incentive to economy which arises from the introduction of more immediate Provincial interest.

2. The suggestion (for which we were indebted to Colonol Brownlow) which we subject to the Government of India is that the deficulty of provincializing such works can be surmounted by an arrangement upon a basis obout to be described. The arrangement twould be a special subsidiary one and not part of the regular Provincial contract, first, because it is obvious that its duration must be fixed on special considerations and may or may not be the same as that of the regular contract; second, because it must be a slipulation that the money allotted under the orrangement is appropriable only to the particular purpose defined and cannot be used for any other; and third, because it looks forward to a time when an accurring profit may be made invallable for Provincial purposes apart from, and in addition to, what would otherwise be the measure of the allownnee to the Province.

8. The Province would then submit to the Government of India a project for an irrigation work, estimating the amount required for Capital construction year by year, and annual manutenance charges, both during construction and for a period nat exceeding ten years from the opening of the canal, after the expiry of which period, according to the estimate, the revenue would be sufficient to most both mainformace theory and interest on Capital. Open this basis, the Imperial Government would undertake to furnish year by year the money required for Capital construction, but would meantime bear all revenue charges, including that for interest on Capital. At the term fixed (or,

Mr. John Tate.

Sardar Coopas

swamy Mudliar.

Mr. John Tate. 21 Dec. 01.

at the option of the Proriocial Government, at any earlier date) the work would become ofther partly or wholly Provincial as the Government of India may decide.

- 4. It seems on the whole advisable that the responsibility for the interest, which neernes during construction and until the taking over of the work, should rest with the Local Government, and it can hereafter he determined whether these arrears of interest should he treated as a loan (as hetween Imperial and Provincial) and recovered hy unusual instalments, or should he added to the Capital eccount of the work.
- 5. We have discussed the general proposal with the Government of the Paujab, and have ascertained that the principle thus suggested will be cordially accepted, provided that an agreement can be come to is each care as to the figures ou which a contract with the Provincial Government should be based. We, therefore, go on to doal with the question in detail as for as it applies to the Paujah.
- 6. Before any causis can be provincialized, the principle must be decided by which the revenue due to irrigation is to be distinguished from the land revenue proper. We are informed that in the Punjab a different system of calculation exists on overy causi, and in one case the whole revenue is treated as irrigation revenue. These questions will have to be settled between the Government of India and the Provincial Governments with the distinct object of putting an end to any financial doubt or dispute as to the chare in the increase of land revenue which shall necrae to the Imperial or Provincial revenue; and it seems necessary that the method of calculation should be precise and should rest on facts easily ascertainable, and should not, as we believe to the case now in Madras, he merely a rough
- 7. For purposes of provincialization, irrigation works divide themselves into the following categories:—
  - A-Works for which soparate Capital and Revenue Accounts are kept-
    - (a) of which the Capital Account is so far advanced that Revouus operations are in full working order, the remaining Capital coastruction being on such works us distributaries, which are calculated to bring in revouue immediately;
    - (b) which have not yet reached the whove stage.
  - B-Works of which the Capital Account is not separate from the Rovenue Account, that is, Capital operations are of comparatively small amount, and are ulmost obligatory as part of the maintenance of the work.
- S. To the first category, A (a), belong, in the Punjab, the Western Jumna, the Bar: Doah, and the inundation canale, except the Muzasfargarh inundation canal, which belongs to Class B.
- 9. Officials of the Punjab Geverument have suggested that there may be a little difficulty in provincializing the Western Jumus Caual, the revenue from which is lisole to occasional fluctuations arising from the character of the season. We conceive that it may not be easy to settle with the Provincial Government the estimate of revenue and expenditure at which the caual should be transferred to Provincial; but we have the statistics of meny past years upon which to base an average estimate for the feture, and we do not find that the fluctuations have been lorger in this caual than on those in the North-Western Provinces, which have been provincialized.
- 10. Canals of the Class A (b) are represented in the Punjah by the Sirhind Canal, the Lower Soling and Para, the Chemh, the Sidinai and the Swat River Canal. Of these there is as yet no revenue experience, and they can be provincialized only in the sense and under the system explained in paragraphe 2 and 3 of this paper.
- 11. Class B is represented by the Mazesfargerh Caual, of which the expenditure might be whelly provincialized if it is possible to provide for the separation of that part of the land revenue which is due to irrigation from the land revenue proper.
- 12. Since this note was priated, we have shown a proof to the Lientenant-Governor of the North-Western Provinces, and the principle of the proposal has received from hun the same cordinl acceptance as it has from the Punjab Government subject to the same examination of the figures in each individual case. Sir A. C. Lyall has informed us that he doubts if the Betwa Canni can be provincialized as yet, since, though the mann works and most\_of the distributaries have been completed, the canal has only been

opened for about ten mouths, and the data for estimating its future revouns are not sufficient. His Honour would, however, willingly causent to the construction of the Sarda Canal on the suggested terms and conditions.

ORDER.—Ordered, that copies of the note be forwarded to the several Local Governments (except Control Provinces and Assam) for an expression of their views no the subject, with special reference to the several classes of canals within their limits, and the possibility of applying to each of such classes the principles proposed by the Finance Committee.

- (3) Letter from the Government of India, Finance and Commerce Department, to the Chief Scoretary to the Government of Bombay, No. 4347-A., dated the 10th October 1896.
- In paragraph 42 of my lotter No. 4282-A., dated the 7th October 1896, it was stated that the Government of India propose to make Provincial in the new Provincial contract all irrigation works in Hembay proper and Gujarat, and that a separate communication would be made to the Government of Bombay. I am new directed to address you on the cohject.
- 2. In a despetch No. 55-P. W., dated 17th December 1885,; the Secretary of State commented on the financial failure of irrigation works in the Deceau and Gujarat, and requested the Government of India to consider whether it would not be possible and desirable to relieve the general revenues from the charges arising from the interest on the Capital outlay on unremunerative works, and debit them against the Provincial revenues of Bombay. These remarks of the Secretary of State were communicated to the Government of Bombay in this Department letter No. 1943, dated 28th May 1886, and it was stated that in the opinion of the Governor General in Council it would be advantageous alike to the Imperial and Provincial Governments if, at any rate, all the irrigation vorks in Bombay, which had here classed as Productive, were made Provincial. It was accordingly proposed that all irrigation works in Bombay classed as Productive should be made over to Provincial, the Provincial revenue heing charged at 4 per cent, per aumam on the total Capital outlay and the revenue derived from the transferred works heing credited to Provincial as a set-off against the interest charges.
- B. In October 1886, and before a reply was received from Bombay to the above letter, the Finauce Committee, in reporting on the terms of the Provincial courtect with Bombay for the five years from 1887-88 to 1892-93, recommended, in paragraph 205 of their report, the provincialization of all muor irrigation works is the Bembay Presidency, and the note was forwarded for consideration to the Government of Bembay with this Department letter No. 3686, dated the 14th October 1886.
- 4. These proposals for making Provincial the major and minor irrigation works in Bombay were discussed by the Government of Bombay in their letters Nes. 3667 and 3668, dated the 3rd December 1886, and for reasons stated in those letters that Government expressed their disinclination to entertuin the proposels. Shortly afterwards there came a time of great financial pressure, and the Government of India were, obliged in 1889-90 to levy a special contribution of 173 lakbs from the Bombay Provincial rerennes. The question of the provincialization of the irrigation works was allowed to drop.
- 5. The Governor General in Council is convinced that it will now be ndventageous to effect the provincialization on the general principle of vesting the Local Government with a more direct financial interest in works which are practically under its own coutrol.
- 6. It is not, however, proposed to include Sindh in the arrangement,—irrigation works in Sindh are now in a transition stete,—and for some time to come the expenditure is likely to he heavy and irregular, whilst the revenue prespects are very uncertain. The question is also too closely mixed up with the land revenue of the Province, which caunct he wholly provincialized.
- 7. In the Decean and Gujarat the condition of uffairs is different. The main works are practically complete and the rereduce has attained a stage of fair stability. Subject, therefore, to any observations which His Excellency the trovernor in Council may desire to make, the Goycrament of India propose to make provincial the whole of the direct revenue and expenditure (molading interest on capital) connected with major and minor irrigation works in Bombay proper and Gujarat.

S. The revenue and expenditure figures for these works for the five years, 1892-93 to 1896-97, are as follows:—

Major Works.
In thousands of rupees.

•		1692-93,	1893-01.	1881-93.	1905-08. Roussed	1806-97. Badget.
Direct Beecipts .	•	4,43	4,48	4,49	4,75	5,31
Working Expenses		2,03	1,87	10,12	1,83	1,63
Net Révenue		2,40	2,89	2,45	2,01	3,40
Interest		7,04	7,18	7,21	7,20	7,30

#### Minor Works.

····						
Direct Roreino .		77	03	03	1,07	1,01
Livenno Expendituro	•	2,42	3,13	8,05	3,03	4,41
Vel Bescune Cparks	•	1,03	3,20	2,78	1,93	3,40
Capital Expenditure	٠	03	1,51	92	41	79
Total Net Chargo	٠	2,30	3,74	3,07	2,43	4,10

9. For the purpose of calculating the assignment to be made to provincial revenues in the new contract, the Government of India propose to leave out of account the hudget estimates for 1898-97 (which contain some altogether special teatures), and to take the average of the last three years under all heads except capital expenditure on minor works. In recent years this capital expenditure has consisted principally of the outlay on the Mutha Canals and other major works which have failed to fulfil the conditions of Productive Public Works. These works have virtually been completed, and in the opinion of the Government of India a total assignment of Rs. 2,00,000 will be sufficient to meet the requirements for capital expenditure during the five years of the new contract. The not assignment to be made to Provincial revenues in the new contract would therefore be Rs. 7,26,000 made up as follows:—

### Major Works.

					ile.
				٠	4,66,000
ı	•	,	٠	•	1,01,000
					7,20,000

## Minor Works.

Recoune						03,030
Expenditure	•	•		•	•	3,09,000

The interest charge will be really somewhat in excess of Ra 7,20,000, but on the other hand it is assumed that with the outlay of the capital on which the excess is charged the net revenue has also increased since 1891-95.

- . 10. I am to request that the Government of India may be favoured with the views of HIs Excellency the Governor in Conneil on the proposals in this letter.
- (4) Note by the Secretary to Government, Public Works Department, dated 7th January 1898, on the Provincialization of Irrigation Works in the Decean and Gujarat.

The Government of India have decided that it is now expedient to provincialize all Major and Minor irrigation works in Bombay proper and Unjarat, and have forwarded, for any remarks this Government may wish to make, the considerations and calculations on which they have based the assignment they propose during the new pravincial contract.

2. I read the Government of India's letter to mean that the principle has been finally sottled, but that they are willing to consider any observations which His Excellency the Governor in Council may wish to make on their proposals for giving it effect.

3. The Government of India offer Rs. 7,26,000 annially during now contract. In the first place, it is necessary to have a clear understanding of what this Government are expected to do for this amm. I take the offer to mean that for the future the Government of India divest themselves of all interest in or liability for Major and Minor irrigation works as they stand at present in the Deccan and Gnjarat: that daring the new contract they will give nothing more for, and take nothing from, existing Irrigation works, Major or Minor.

The proposal does not to my mind preclude this Government from applying to the Government of India for fueds for well-considered and duly sanctioned projects for new works under 35—Protective or 49—Productive. For minor works, however, I understand that provincial expenditure is limited, and that during this contract no further domand nuder this head is expected to be made.

4. I may now proceed to examino the offer of the Government of India, and its offect on our Establishment charges is the first thing to be considered. The Examiner of Public Works Accounts has deduced from the details of resignment offered by the Government of India that it contains an itom amounting to Rs. 2,82,600 for establishment charges. The actual cost of Irrigation Establishment for 1895-96 was Rs. 2,13,000, and the average of provious three years comes to Rs. 2,56,000. The charge for Establishment depends on the expenditure, and if this Government accept the assignment offered as containing sufficient provision for expenditure, they may also be satisfied that Provincial Funds will not suffer as regarde Establishment charges. The yearly expenditure during now contract is not likely to exceed that of 1895-98 or to approach the average of three previous years. So I think it may be taken that Provincial interests as regards Establishment are sufficiently safeguarded. Further, under the new contract, the Kasik and Nagar districts, now classified as Imperial, will become Provincial, and it is probable that we shall be able to carry out Provincial works in these districts as all the Imperial Government.

6. The Government of India deal with direct Revenue and Expenditure, and base their calculations on the actual figures of two years 1893-94 and 1894 1895 and on the figures of revised estimate for 1895-96. They offer to Provincial Government a yearly assignment of its. 7,26,000 made up as follows:—

## Major Works.

					Rs.
	•	•	٠	•	4,56,000
	•	•	•		Nil.
		•	•		1,91,000
•	•	•	•	٠	7,20,000
					9,11,000
					-
	Mi	ior T	orks.		
					98,000
	•	•	•		40,000
•	٠	•	•	•	3,29,000
			•		
					3,09,000
<b>111</b> _	. 1 77				20.00.000
10	CBI ALX	penar	turo	•	12,80,000
out	٠		•	•	5,54,000
					7,26,000
		Total Ex	Total Expendi	Minor Works.  Total Expendituro	Total Expendituro

6. In order that we may judge how far this offer is likely to meet our requirements for the remaining years of the new contract, I have had forcests made, and the results are shown in the following statement, which shows, under each item, the Government of India's offer, the forcest

Mr. John Tate.

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and the average of the actual expenditure and Revenue of five years ending 1896-97:-

	Government	Saperintend-	Average
	of India's	ing Englacer's	6 years
	offer.	iorecast.	octual.
Major Works.	lts.	Rs.	Rs.
Direct Revenue	4,56,000	5,31,758	4,45,960
Expenditure Capital (35) Revanuo Interest	Nil.	*1,24,270	†76,315
	1,91,000	2,10,815	1,99,407
	7,20,000	7,43,606	7,18,680
TOTAL	9,11,000	10,78,691	9.94,852

<sup>•</sup> Incindes expenditure on Theokapor Pank and the Nira Canal. The Schools of Demands for 1893-99, however, provides Rs. 4,670 for the Minnewal Tank. Schools Tank has onto been left out. The salimate far thus project is being revised, but the annuars of the estimates formerly received were Rs. 5,57,25 for direct charges and Rs. 1,153 for Indifferent charges and Rs. 1,153 for Indifferent charges. A total expenditure of Rs. 1,24,881 has been incorred under

<sup>†</sup> Expenditure principally on the Mira Causi.

		Government of fudla's oper.	Superiotend- ing Engineer's forecast.	Average 5 years' actual,
Minor Works. Direct Revenue .	•	Rs. 98,000	Rs. 1,05,704	Rs. 92,237
Expendituro— Capital . Revonue .	•	40,000 3,29,000	41,37,824 4,69,601	†76,298 3,10,453
Total		3,69,000	6,06,428	3,86,750
Total Expenditure		12,50,000	16,85,119	13,81,102
Deduct — Total Revenue		6,51,000	6,37,463	5,38,197
Iotal		7,26,000	10,47,657	8,42,905

Greater part for Bokh Reservoir and Kadna River Works and the lance for Khari Cut, Mulha Consis, Asnti Touk and Yerla River balance for Works, etc.

Taking the items in order—nuder Major Works, the Government of Indus take direct Revenus at Rs. 4,58,000. The forcest gives it as Rs. 5,31,738, and the actual yearly

: lorecoar r	SIACR IF DO YED. O	Paritoni and and docume hearth
	Rs.	average is Rs. 4,45,960.
1602-03 .	4,42,160	The bgures given in the
1593-01	4,45,871	forecast are in excess both
1691 95 .	4.49.243	of Government of India's
1605-96 .	4.71.403	
1576-97	4.21.721	offer and of notnat recorpts
	6) 22, 29, 603	and appear to be based on the supposition that in-
Average	4,43,960	oreased water-rates will be
1696-97 .	6) 22, 20, 603	offer and of neight re and appear to be bas the supposition the

levied in these works. The revenue for 1897-98 will approach its 5,20,000, and the estimats for 1898-99 comes to Rs 4,90,000. We cannot hope that the revenue of 1897-93, an exceptional year, will continue, but I think we may fairly count on a steady increase up to the figures taken by Government of India. But I am not satisfied that this Government would be justified in accepting the Government of India's estimate of revenue as likely to be reached and permanently assured during this contract. The accepts for 1898-97 were only its. 4,21,721. I think we may count on a small permanent increase in time, but the figures for list five years, which are 442, 446, 448, 471, and 421, do not seem to me to warrant the conclusion that we shall have an average of 456 during the new contract. I would suggest, therefore, that the Government of India be asked to reduce the Item that the Government of India be asked to reduce the item to lts. 4,50,000, which is, I think, the highest average we can hope to attain within the next few years.

7. For Capital expenditure on Major Works the Government of India propose to give nothing. This expenditure comes under two heads:—

35 .- Protective Works. 49 .- Productive Works.

Under the latter it is not probable that any expanditure will be required, but under the former some Rs. 25,000 will be wanted during the five years of new contrast. This sum is small, and it is for consideration whether the Government of India abould be asked to increase the assignment by on India should be asked to increase the assignment by Rs. 5,000, or we should trust to being able to provide the necessary funds or be content with the work as it is. On the whole, I do not think it necessary to raise any objection on this account. There are other works under this head, such as the Chankapur and Maladevi Tanks in abeyance, the Shelphal and other works commenced during the late famine, which it may be desirable to complete as Protective works, but which I do not understand as owning within the scope of the present proposals, but to be prosecuted oo their morts from funds to be provided from Famine Insur-aces Fund when projects have been approved and sanc-tioned. I think therefore that we may accept the proposal to incur no capital expenditare on existing major works, as it cannot be said to be necessary, and would in most cases be throwing good monsy after bad.

8. For revonue expenditure on Major Irrigation Works the Government of India offer Rs. 1,91,000 against the forecast of Rs. 2,10,815 and the actuals Rs. 1,99,407. We are cast of its. 2,10,510 and the actuais Rs. 1,90,407. We are usked to take same Rs. 8,000 less than the average and Rs. 19,000 less than the forecast. The figures of the forecast are largely based on increased cost of revenue. It is not probable that special expenditure of any kind will be incurred which does not promise a return more than sufficient to cover extra cost of maintonance. During the last five years the reneue expanditure has varied from Rs. 1,76,844 to Rs. 2,25,892, and the average of the three years taken years the revenue expenditure has varied from Rs. 1,76,844 to Rs. 2,25,882, and the average of the three years taken into account by Government of India, taking actuals for 1895-86, comes to Rs. 1,89,461. Considering then that capital expenditure has ceased and no special expenditure is likely to be incorred which will not more than pay for the increased cost of management, I think the Government of India's offer of Rs. 1,91,000 may be accepted as a fair

9. The noxt item of expenditurolis for interest charges which the Government of India take at Rs. 7,20,000, being the average payment on this secount for three years 1893-94 to 1895-90. In the first place, the interest charge is a steadily increasing one, while capital expenditure is being incorred, and the average of any provious number of yests must be lower than the charge for the last year which remains pormanent, provided capital expenditure ceases.

The figures for the three years taken by the Government of India are as follows :-

			Ke	•
1893-94			. 7,12,6	63 ) Average
1894-95	•	•	. 7,21,3	63 99 88   Average 88   Rs. 7,20,000
189 <b>ŏ</b> -D6		•	. 7,26,4	38 } , ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,

These, as explained, show a steady increase, the amount of which in each year depende on the expenditure of the preced-

In 1896-97 the charges for interest amounted to Rs. 7,24,333, and the budget figures for 1897-98 are its 7,30,000. In future the amount of this always will not fall below that of 1896-97, viz., Rs. 7,28,339, but will exceed it by the interest on Capital expenditure in that year and while each expenditure is being increased.

It may be taken that this expenditure has now practically

at may be taken that this expenditure has now practically title Revised Estimate of Capital cessed, but I cannot see ou wind the foreign to the state of the seed and the ground this Govern-for interest bereafter to fig. 7,29,619: mont can be asked to take there will probably also be some additional charges noder \$3, which will be stan they will actually thrug the total up to, if not over, 7,30,000.

The more than Re. 7,28,339 the state of the seed of the see

mont can be sked to take less than they will actually have to pay, which will be more than Re. 7,28,339 1 and probably about. Re. 7,30,000, which I think should be asked for.

77,002 93,311 02,517 1,02,235 6) 4,61,186 92.237

should be asked for.

10. Caming now to minor works, the Government of India take the revenue at Rs. 193,000, against a forecast of Rs. 192,237.

Rs. 1,05,704, and notant average receipts of Rs. 92,237.
The figures of the revoune forecast appear to, be based on supposed increase of rates, which is at least doubtful during

<sup>†</sup> Principaliy on the Mutha Canale; part on Verla River Works, Lower Punjhrs, Kaden, Joméa, etc.

now contract. The Government of India arrived at their figure of Rs. 98,000 by taking actuals for 1898-94 and 1894-95 and these of revised estimate for 1895-96 as follows:—

Re. 95,000 Actuals. 95,000 Rovised Estimate.

3) 2,93,000 P7,666 or 95,000

The actual receipts for 1895-96 were only Rs. 96,000, so that the overage of the three years comes to its. 94,000 instead of 98,000 offered. Had the Government of India the actuals for 1895-96 before them, they would prebobly have taken thelewer average of Rs. 94,000, and as these works are scattered, many of them, encoll, of uncertain supply, and liable to damage from various causes, I think we cannot sufely recken on on average exceeding its. 94,000 and that the Government of India should be asked to increase their assignment by the Rs. 4,000 here indicated.

11. For Capital expenditure on Minor works we are offered its, 40,000 o year, and although this is considerably below the foreeast and actual figures, I think it will suffice for all our requirements for the five years of the new contract. The figures of the forecast are largely made up of proposed exponditure on Bokh Reservoir and Kadwa River Works. As regards the former, the Government of India have already refused to have anything to do with it; it has been under disensaion for years, and I do not think there is any chance of its coming up for practical consideration within this controct. As regards the Kadwa River Works, the case is different. Some its, 5,40,000 have circady been expended from on estimate of Rs. 5,85,274 sanctioned by the Government of India. A revised estimate is now under preparation, and had it not been for the famine, would have been ready before this. If on receipt of this estimate it is thought adrisable in the interest of work done to complete this project, I think it only fair to ask that the money (probably about 1½ lakhs) should not come out of the centract assignment now proposed, but be granted by the Government of India, os this expenditure has not been taken into account in fiaming their proposals.

12. It now remains to deal with Revenue expenditure on Minor works for which the Government of India propose to give 1893.96 2,75,193 1893.97 2,75,193 1893.97 2,75,193 1893.97 2,75,193 1893.97 2,75,193 1893.97 2,75,193 1893.97 2,75,193 1893.97 2,75,193 1893.97 2,75,193 1893.97 2,75,193 1893.97 2,75,193 1893.97 2,75,193 1893.97 2,75,193 1893.97 2,75,193 1893.97 2,75 1

follows :--

| Rs. | 7,87,802 | Southern Division | 9,47,143 | Gentral Division | 6,27,275 | | 5) | 23,43 020 | | Average | 4,68,604

The figures for Northern Division may safely be reduced to Rs. 5,00,000 by omitting proposed expenditure on drainage and reclamation works, which in the first place are not connected with irrigation, and, moreover, are not likely to be commenced within this contract. In the Southern Division the Superintending Engineer proposes a very largely increased expenditure on old tanks. I do not think there is any probability of our being able to spend much more than we have been doing, at least during the next three years, and by reducing the forecast to Rs. 6,10,000 we leave sufficient for our requirements. The forecast for the Central Division may be taken pretty nearly as it stands of Rs. 6,20,000. Our requirements then ore—

| Rs. | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division | Southern Division

or an average of 3,46.000 for the five years. This sam is based on estimates more or less untrastworthy, and cousidering that we have only been able to spend Rs. 3,10,452 on an average during the last five years with the Government of India to draw on, I am joelined to think what they offer now will be as much ne we can profitably spend during now contract.

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13. To sum up, I think the figures for expenditure taken by the Gevernment of India are fair and will admit of the works being kept in fair order and allow of their operations being extended as far as it is probable that this Government would be able or prepared to go within the period of new contract. As explained in paragraph 9, it will be necessary to ask for an addition of Rs. 10,000 to the item allowed for interest charges, and I think the Government of India have taken rather a sanguine view of the revenue both from Major and Musor Works, and one which I think, with the actual figures for 1895-96 and 1896-97 before them, they will readily see the necessity for modifying. As explaiced, I would suggest that the revenue from "Major Works" be taken of Rs. 4,50,000, and that from "Minor" at Rs. 94,000, which will have the effect of increasing the proposed assignment by Rs. 10,000 and bringing it up to Rs. 7,36,000, and this with the Rs. 10,000 extra for interest charges will bring the total assignment to Rs. 7,46,000, which I consider is required to make the proposal fair and safe for this Government. I would also suggest that the position of this Government as regards the Kadwa River Project and the undertaking of whatever new works under "35-Protective" or "49—Productive" may be found to fulfil the necessary conditions after full investigation be clearly defined. I have one more remark to make regarding drainogo works in Gujarat, for which large expenditure was proposed in Superintending Engineer's forecests. These works have been very successful so far, but they are in ne way connected with irrigation, being in reality land improvement works. From past experience I anticipate there would be no great difficulty in getting future expenditure olassified as productive and fnods provided under "49"; in any cose, it seems to me that the charges should be against Land Revoune and not Irrigation.

#### (5) Letter to the Government of India, Finance and Commerce Department, No. 907, dated 26th February 1898.

With reference to your letter No. 4347-A., dated 10th October 1896, in which proposals are made for the proviocialization of all irrigotion works in the Deccan and Gujarat. I am directed to request that you will be so good as to state, for the information of this Government, whether the decision which the Government of India boye arrived nt in regard to the terms of the provincial settlement for the remaining four years of the carrent quinqueonial period and which has been communicated in your letter No. 711-A., dated the 10th instant, extends to the irrigation works in the Deccan and Gujarat. I am to state that His Excellency the Governor 10 Council is now prepared to examine the proposals in dotail, but that in the present financial circumstances he would prefer not to undertake a new service under somewhot speculative conditions. I am to observe that the direct revenue by no means represents all the profit to Government of these irrigation works. In many places the income is in the shape of consolidated extend this eystem, which is credited entirely as land revenue, and where there is an assured supply it may be expedient to extend this eystem, which gets rid of many administrative difficulties. Even where there is no increase of assessment at all on account of water advantages, load below tanks benefits from the raising of sub-seil water and the facility of making serviceable wells, and the revonue from it is thus secured. In those circumstances, as land-revenue is mainly Imperial, it is oppropriate that the expenditure on works which so greatly affect it should be also Imperial. The Government of India recognize that this principle should be applied in Sind, and the connection of the irrigation works with land revenue in Gujarat and the Decoan differs only in degree from each connection in Sind.

2. If the Government of India decide that this Government should proceed with the consideration of the provincialization scheme, it will be necessary to settle what arrangements are to be made for the completion of the protective works which have been begun as famine works. This Government cannot, of course, provide the necessary fund under the existing form of settlement, and as the remarks

Mr. John Tate. 21 Dec. 01.

above made would especially apply to them, the provincialization even of maintenance and interest charges after completion of the works would be of doubtful propriety. The provision of the capital is certainly a matter of famine insorance, and should, the Governor in Council considers, be made as such.

(6) Letter from the Under Secretary to the Government of India, Finance and Commerce Department, No. 1705 A., dated 15th April 1898.

I am directed to acknowledge the receipt of your letter in the Financial Department, No. 907, dated the 26th February 1898, and in roply to easy that the Government of India bave no present intention of provincializing the irrigation works in the Decean and Gajorat, and that the decision contained in the letter from this Department, No. 711-A., doted the 10th Fohrnary Inst, does not extend to these works.

- 1. Q. (Mr. Muir-Mackenzic.) The disinclination to sottle the question of provincializing the irrigation works was due, I believe, to the foot that we were just beginning the Famine of 1896?—I do not doubt that, but the reasons given were that the financial position of the Government was such that the proposal had to be chelved. The facts are set out in paragraphs 2 to 4 of the letter from the Secretary to the Government of India, to the Chief Secretary to the Government of Bombay, No. 4347, duted 10th October 1896. The letter is nttached to my note.
- 2. Q. There was the difficulty clse, I believe, of revising the Provincial Contract at the time?—Partly that, but there was also the question of establishment. The matter has not come up for discussion in my time.
- 3. Q. (The President.) What is your own personal view on the question?—I think it is more a question for the Finance Department than for the Public Works Department. We have no difficulty in getting funds from the Government of Indie. That Government is old incolly in getting funds for improvements, if fair reasons are given, Leaving the financial question out of consideration, the present orrangement is best for the works, as we can get all the funds we want. They are better maintained probebly than they would be, if the Government of Bombay had to find the money out of limited funds.
- 4. Q. (Mr. Higham.) The Government of Bomhay is just as likely to give money no the Government of India, it is can be spent profitably?—Yes just as likely, if they had it to give.
- 5. Q. (Mr. Mair-Mackenzie) In regard to oivil roads, which are Provincial, the grants are as liberal as Government can unke them, are they not ?—Yes, I have no apprehension that the Department will be less favourably treeted if provincialization takes place.
- G. Q. (The President.) Are there any irrigation works in this Presidency that are treated as Provincial?—Yes, one, the Gokak Canal, but the conditions of this are peculiar.
- 7. Q. Haw nro Productive and Protective works distinguished? -Productive works constructed from loan funde; Protective works are from Government of India moosy.
- 8. Q. And the fact that the works are Imperial leads to anouslous establishment charges?—Yes. With the permission of the members of the Commission, I will read the note I have prepared on the Provincialization of establishment charges.

The witness then read the following note on the Provineialization of Establishment and Mode of distributing Charges --

The provisions which regulate this are contained in paragraphs 2110 and 2120 of Volume II of the Public Works Department Code. The nature and extent of the application of these rules are explained in Government Resolution No. 1903 dated 14th December 1894.

In their Recolution No. 316-31—A.I., dated 21st September 1875, the Government of India sanctioned certain rules for apportionment of cetablishment charges. By Government Resolution No. 454, dated 15th September 1879, certain additions were proposed to meet the special exigencies of this Presidency, and the approval of the Government of India was applied for in letter of the same apparent and dot. The Government of India declined to make any change in the rules. A further communication was addressed to the

Government of Indie, No. 631, dated 24th December 1879. That Government theo naked for forther information, but no commonication appears to have been made.

In 1887 "Irrigation" as a separate Department was abolished. The effect of the orders regarding treatment of certain districts as Provincial and Imperial was considered, cod as a result orders were issued to the Examinar in memorandam No. M-39, doted 10th July 1889, in which the following divisions and districts were treated as Imperial:

Divisions.

Districts.

Sind . All in Sind. Central . Poonn Irrig

rul . Poonn Irrigation.

Nira Canol (since abolished). Khandesh Irrigation.

Ahmodungur.

Násik.

Belgonm and Dhárwár (now Dhárwár Irrigation).

The proposals of this Government were approved by the Government of India in their letter No. 1078, dated 9th July 1889. The Government of India, in their letter No. 145 A. G., dated 8th Soptember 1888, painted out that the omeants charged to Imperial Irrigation in the Ahmednagar and Nasik districts under the above arrangements were charged the stricts and the stricts of the districts of the di

The matter was considered and this Government addressed to the Government of India letter No. 1289, dated 14th August 1894, in which it was proposed to provinciolize the office of the Superintending Engineer, Central Division, nlong with the two districts referred to, and it was suggested for the consideration of the Government of India that an additional annual groot of Rs. 30,000 to Provincial should be made.

The Government of Indie asked for some further information, which was given in this Government letter No. 1925, dated 19th December 1894. Certain further information was also furnished with letter No. 538, dated 21st March 1895. No reply from the Government of Indie has been received, and the Dietricte and Divisious referred to are still classed as Imperial.

A statement showing the actual cost of Establishment under all heads for the tea years ending 1900-1901 is attached with copies of the important letters montioned in this Note.

Accompaniments to note:-

(1) Statement showing the total Outlay under all heads and total Charges for Establishment with percentages for the last len years.

Year.		Total Outlay excluding suspense beads,	Total Charges for K-tablish- ment.	Percentage.		
(		Rs.	Rs.	Rs.		
1891-93 .		69,86,721	17,59,840	25:20		
1892-93 .		63,23,615	18,18,828	28.80		
1893-94 .		66,82,441	19,25,203	28'82		
1894-95 .		68,92,076	20,01,062	29-03		
1895-98 .		77,34,978	20,20,515	28 00		
1896-97 .		81,85,937	19,91,652	24.83		
1897-98 .		72,49,293	19,29,833	- 26-63		
1898-99 .		67,06,903	19,55,489	29-16		
1893-1900*		68,15,050	19,91,223	29·13		
1900-1901*	•	74,40,616	20,76,378	, 27.91		
Average	•		•••	27;5		

\* Excluding "Famine Relief.".

(3) Letter from the Secretary to the Government of India, Public Works Department, to the Secretary to the Government of Bombay, Public Works Dopartment, No. 145 A-G, dated the 8th September 1893.

No. 145 A-G, dated the 8th September 1898.

In forwarding herowith a statement showing the distribution of the cost of executive establishment in the Almodusgar and Nasik divisions for the five years ending with 1893-94. I am directed to observe that, owing to the fact that these divisions are classed as Imperial divisions, the amounts obargeable to Provincial and Local Funds on necount of establishment (inclusive-of Direction and Accents) are calculated at 23 per cents on the outlay on works and repairs in accordance with Public Works Department Code, Volume 11, Chapter XV, paragraph 132, the balance of the establishment charges after deducting the share chargeable ta Imperial Military Works, Civil Works and Barrack Deparlment, being debited to Imperial Irrigation. The amounts eo charged to Imperial Irrigation Works ore abnormally high, the percentage on works

of executive establishment only ofton exceeding 150 Mr. John per cent.

2. When the proposal for the amalgamation of the Ahmeduagar and Nasik Provincial districts with the Irrigation districts and their classification as Imporial was approved in Public Works Department letter No. 1978-G.; dated 4th July 1889, the Government of India did not anticipate the annually of establishment charges in a division in which Provincial and Local Fund expenditure predominates being distributed so unegoally, that the percentage on Imperial Irrigation expenditure on works and repairs would amount to over 150 per cent., while that upon Provincial and Local Fund expenditure remains at 23 per cent. only. I am directed to request that the Government of Bombay will report upon the question and consider whether the classification of the divisions in question should not be changed from Imperial to Frevincial.

Accompaniment to Government of India letter No. 145-A.G., dated 8th September 1893.

Statement showing the distribution by funds of the cost of Executive Establishment in the Ahmednagar and Nasik Divisions for five years ending 1893-94 and the percentage it bears to the outlay on Works and Repairs.

	ACTEALS, 16	50-10	Actua	£0, 150	0-01.	ACTUAL	e, 1601	·f2,	Realer 15	r Frii 02-63.	IATE,	Bedo b	F07) 11 93 01.	ATE,
<b>;</b>	Onting on Works and liepairs. Cost of Excentive Excellenment.	Percentare.	Ontisy on Works and Regules.	Cost of Executive Establishment	Percentago.	Outlay on Works and Boraire.	Cost of Erecative Establishment.	Persentage.	Oatlay on Works and Berales.	Cost of Exceutive Establishment	Percentago.	Oatlay on Works and Repairs.	Cost of Executive Establishment.	Percentage
	Rs. Rs.	Ľ3,	Rs.	Re.	13+	Rs.	Re.	Re.	By.	lls.	Ra,	Re.	Rs.	Ru.
Anusdragan Division.		1												
Imperial.														
Lilitary Works Listack Department Civil Works	12,76) —1,52 70,21	7 23%	20,211	610	1 23 1	7,171] 21,710 5,011 1,303	5,05% 5,05% 5)7 300	57.0 D 1 57.3	9,130 29,100 6,000 110	COO	23 1	92,71 9,030 120	7,590 000 30	23 1 23 1 20 0
Total Imperial	01,242 15,26	9 107	100.1	10.612	217	36,153	17,770	49.3	41,010	15,20)	CO-7	49,100	21,510	111
Provincial (Civil Works) Local (do.) Contributions	1,11,791 53,10 60,812 7,97 21	2 } 12'7 0 051 6	1,1°,825 65,073 41	33,617 7,021 8		\$ 70,190	25,440 B.5 1	} 23 0 1 0	60,120 03,9-0 130	23,0:0 7,680 20	15:4 } 23.1	77,010 68,910	21 13	} 23·0
Geand total .	2,72,477 60,40	207	2,60,020	64,057	23'1	1,95,189	81,797	25 0	1,61,970	63,070	826	1,85,210	53,000	28 8
Nasie Daylelon.		1					i			-	_		i—	
Inperiol.														
Icrication Works	21,621 51,9	1471	8,26	15,31	18318	9,307		65 7	0,710	18,160	166.5		21,614	183'5
Civil Norks	600 II	3 23.0	1,252	254	23.0			230	910	100	23 8	750	170	22.7
Total Imperial	23,783 3410	7, 1117	9,521	15,6:5	101-1	0,010	8,1(4	81.9	10,520	19,310	174 8	11,930	21,910	146*9
Provincial (Civil Works) Loral the Contributions	81,705 3,7 29,279 3,40 801	3 3 27	1 31,910	\$1,018 4,209 0	1 23.1	1,00,823 87,712 11,07	2P,101 3,678	22·0	64,210 53,320 2,930	20,760 ), 5,520 ) 280	230	43.010	,7 20 5 ,271	23.0
Grand Total .	1,02,060 33,20	33.6	1,31,293	43,010	33.1	1,69,127	1 42 22	250	1,31,000	45,000	31 5	1,24,32	47,000	37'5

Nate.—The perentages against Irrigation works with be considerably larger when the charges on account of Direction and Accounts are added to the Executive establishment.

(3) Letter from the Secretary to the Government of Bombay, Public Works Department, to the Secretary to the Government of Iudia, Public Works Department, No. 327 A.—1283, dated the 14th August 1894.

In reply to your letter No. 145—A.G., dated 8th September 1803, and subsequent reminder, I am directed by His Excellency the Governor in Council to state that the subject of provincializing the Nésik and Ahmednagar districts, which are ut present classed as Imperial, has received very caroful consideration at the bands of this Government.

2. The arrangement approved by the Government of India in 1830 included the proposal to classify, as below, the offices which, on the reduction of certain Irrigation

offices, were for the Inture to carry on the mixed duties,

Imperial . Chief or Superintending Engineer,

Nasik.
Ahmednagar.

Provincial . { The Gojarat districts. Satara. Shelapur.

The other offices remained either purely Imperial Irrigation or purely Provincial. Thus, in three offices, the Irrigation duties were combined with Provincial, and in other three Provincial duties were added to the Irrigation.

Mr. John 21 Dec. 01. 3. I am to remark that, although the question before this Government is the provincialization of the Masik and Ahmedaagar districts only, His Excellency the Governor in Conneil is of opinion that a complete solution of the matter requires that the office of Chief (ar Superintending) Engineer, Central Division, should be included with these; for, were the two districts named to be mede Provincial, the office of Chief Engineer, Cautral Division, would alone among the mixed officer, respiration and the nature onteo of One Engineer, Cautral Division, would alone monog the mixed offices, remain Imperial, and the nature of the then charge would offer no groands for euclin olassification to continue. Whereas, at present, the Central Division consists of four Imperial and three Provincial districts; it would, \*Imperial.

were Nosik ond Ah-Poona District. Khandesh District. Sholopar District. ineduogar provin-olnlized, comprise hnt two Imparial to five Provincial dis-Poona Irrigation. Khandesh Irrigation. Rásik. Ahmednagar. tricts,† and it fol-lows, in the opinion lows, in the opinion of His Excellency the Governor in Conneil, that, if the Násik, Ahmednage Poons, Khandesh, Sholaner daagar. Poone Irrigation. Khandesh Irrigation. of the classification

two districts be changed from Imperial to Provincial, that of the office of Chief Engineer, Centrel Division, must be changed also.

4. With a view to this, the three offices have been considered together, and the possibility of a further reference bereefter, concerning an anomalous Imperial office, will thne he nvolded.

5. I am now to invite reference to the correspondence that took place in 1887-89 regarding the reductions in establishment in this Presidency, and a brief recapitulation of the measures taken and the results obtained will not be

6. In response to n demond for reductions in establishment, it was decided to abolish cortain Irrigation offices which, at large cost, controlled but little exponditure, and the works in charge of which produced hut an insignificant revenue, and to amalgamate the duties then performed by these offices with those of the general branch offices of the districts concerned. In this way the offices of Chief Engineer for Irrigation, and Executive Engineers for Irrigation, Nasik and Ahmeduagar, Sholapur and Bijapur, Gujorat and Satara were oblished and the duties taken over, respectively, by the Superintending Engineer, Control Division, and the Executive Engineers of Nasik, Ahmednagar, the Gujrat districts, Sholapur, and Satara—all Provincial offices—a saving being thus secured which, on the best of the figures for 1887-88, was estimated to total come Rs. 96,000 per annum. 6. In response to n demond for reductions in

besis of the figures for 1887-88, was estimated to total some its, 96,000 per annum.

7. Had changes ceased there, it was estimated that this large saving effected in the Bombay establishmeate would have been almost entirely to the ndvantage of Imperial Fnuds, it having heen estimated that about Rs. 1,000 manually only would be saved to Provincial, the histonic of Rs. 95,000 going to Imperial. This was considered to be an inequitable distribution, and to give to Provincial on inadequate share of the savings arising from occaomies effected in its own establishment; and the saggestion than arose, which was occepted by the Government of India in 1889, to imperialise three of the six offices performing the mixed dutics, and the three offices so imperialised were the Chief or Saperiatending Engineer, Courtal Division, and the Nerik and Ahmedangar districts. The result of this on the besis of the same figures, was, as then calculated, to

epportion the saving of Rs. 96,000 between Imperial and Provincial in the proportion of shout Rs. 84,500 to about Rs. 11,500. Imperial still gitting the very much larger shere, while in addition there was also a probability of fature modifications adverse to Provincial, owing to reductions in Capital expenditare. It must be assumed that the Government of India recognised the offect of the accepted classification, and acknowledged that Provincial was entitled to the share of the savings offected which this ensared.

8. This Government is now asked to consider why the offices then made Imperial should not be provincialized, in view of the fact that the result of the existing system is that Imperial Irrigation is charged with shnormally high percentages for establishment—an anomolous condition of things in districts in which expenditare on Provincial and Local largely predominates.

things in districts in which exponditure on Provincial and Local largely predominates.

9. His Excellency the Governor in Council, I am to remark, fally recognises the anomalies, and for other reasons heyond their romaval would he glad to see these officers classified as Provincial; but ho is of opinion that in approaching the subject, the reasons which led to the adoption of the present classification chould not be lost eight of, and that the principle of leaving to Provincial a fair share in the economies officeted by the amalgation of offices should he maintained.

10. I am directed to present to the leaving to Provincial a fair seems of the maintained.

10. I am directed to uppond to this letter a statement repared by the Examiner of Pablic Works Accounts, exhiprepared by the Examinor of Pablic Works Accounts, exhibiting the distribution of establishment charges between Imperial and Provincial of the three offices in question, eccording as they are classed as Imperial or Provincial, for the five years ending 1893-94, from which it will be seen that, had the Provincial elessification existed, there would have been an annual average loss to Provincial (and a corresponding gain to Imperial) of Rs. 29,672 during that period.

11. It will be evident from this that, had the Provincial 11. It will be evident from this that, had the Provincial classification existed, not only would Provincial Funds have received an henefit whatevor from the economics offected in 1887-88, but they would bove been put to n clear loss of some Rs. 18,500 annually, while Imperial, instead of saving Rs. 85,000 would have profited to the extent of some Rs 1,14,500, of which Ro. 18,500 would have been actually at the expense of Provincial Funds.

12. His Excelionéy the Governor in Connoil trusts that under these circumstances, the Government of India will

12. His Execlency the Governor in Connoil trusts that under these circumstances, the Government of India will recognise the right of this Government to lock for compensation in the chape of an adequate addition to the Provincial grant, or to an addition to the late of 23 per cent. now received for Imperial expenditure, if these offices are provincialized, and I am directed to suggest, for the consideration of the Government of India, that an additional mounal grant of Rs. 30,000 to Provincial, to enable this Government to meet the additional charges, would be an equitable re-adjustment, nuless the Government of India would prefer to give componsation by a special re-adjustment of

re-adjastment, nuless the Government of Indio would prefer to give componsation by a special re-adjustment of the percentage rates. If the terms of the re-adjustment ran he satisfactorily settled, immediate steps will be taken to provincibilize these offices from the 1st Apili next.

13. I am to submit that, sholad the Government of India not he prepared to great the compensation suggested, this Government would be, it considers, inequitably treated in being called on to sacrifice the small edvantage to Provincial, which, owing to the Imperial classification of these offices, neorged from the economies effected in 1887-88, and to further hurden Provincial Funds with considerable additional charges for Establishment.

Statement of distribution of Establishment charges showing the effect on Provincial Funds during the five years ending 1898-94 if the classification of the offices of Chief Engineer, Central Division and Executive Engineers, Nagar and Nasik Districts, were altered from Imperial to Provincial.

	1659-	1659-00. 19		1990-01.		1891-02.		1902-83.		1893-91.		AVERADE PER TEAR	
Officee,	Imperial.	Provin- cial, Locol, ctc.	Imperial.	Pro- vincial, Local, elc.	Imperial.	Pro- vincial, Local, cic.	Imperial,	Pro- vincial, Local, etc.	Impe-	Pro- vincial, Local, etc.	[mperial.	Pro- vincial, Lucal, etc.	
Distribution as per existing Imperial Classification	Re.	Rs.	Es.	Rs.	Rs.	Rs.	Rs,	Re.	Re.	Bs.	Rs.	Br.	
Chief Engineer, Contral Division . Executive Engineer, Ahmednagar,	25,476	30,068	23,044	10,450	25,055	10,147	25,001	15,120	15,070	22,000	25,676	20,704	
District Executive Engineer, Nank Dis-	15,263	41,223	18,622	41,465	17,779	34,000	18,413	27,312	14,902	33,033	15,614	36,415	
precentio collineat right pie-	32,107	7,155	18,820	29,203	6,103	94,182	10,302	25,699	9,075	37,925	16,611	26,876	
TOTAL .	72,851	38,443	60,292	£6,233	61,671	87,28P	05,748	09,359	39,707	07,063	58,035	83,887	
Distribution as per proposed Pro- clasion Classification. Chief Engineer, Central Division . Executive Engineer, Ahmedusgur District Executive Engineer, Násik Dis- trict .	11,846 24,633 4,007	41,106 81,658 35,255	0,093 17,655 3,777	31,941 40,532 40,142	7,098 10,129 4,065	37,734 41,058 39,178	7,031 5,033 3,288	36,172 37,141 41,902	11,215 14,271 4,740	26,455 39,720 43,260	9,460 15,027 3,078	85,670 58,003 39,517	
Total .	30,990	1,11,409	31,015	1,15,515	21,292	1,17,547	19,602	1,15,215	30,220	1,07,431	25,402	1,18,429	
Difference due to change .	-32,968	52,065	-29,277	19,277	≃50,279	30,270	-45,550	45,855	-0,478	0,479	-29,573	29,572	

(4) Letter from the Deputy Secretary to the Government of India, Public Works Department, to the Secretary to the Government of Bombay, Public Works Department, No. 137-4.G., dated the 12th September 1894.

With reference to your letter No. 327A.—1289 of the 14th Angust 1894, on the subject of the proviocialization of the Nésik and Ahmedangar district, I am directed to request that you will furnish the Government of India with a statement in the accompanying form showing the total cost of the Public Works Department establishment in Bombay proper (excluding Sind) for the five years ending 1893-94 re-distributed in necerdance with the following principles:—

- (a) The whole of the Public Works Department establishment of Bombay proper to be treated as Provincial and the cost of that establishment divided between Imperial, Provincial and Local Funds in proportion to the outlay incurred on works and repairs from each of those Funds, after deducting the chars chargeable to the University Respectively of the Publishment at 10 per cost, and to the Buildings and Roads and Irrigation Branches on necount of revenue collected at 5 and 10 per cent. respectively.
- (b) If there be a superate Revenue establishment on account of Irrigation works, the whole cost of that establishment to be charged to Irrigation instead of the 10 per cent on Revenue.
- (c) The charge to the Harrack Department to be calculated in accordance with Public Works Department Code, Volume II, Chapter IV, paragraph 147, clause iil.
- 2. The total charge for establishment to each fund will thus be made up of the sunre calculated at the proportionate rate mentioned in paragraph 1, clause (a), plus the revenue collection charges.
- (5) Letter from the Secretary to the Government of Bombay to the Secretary to the Government of India, Public Works Department, No. 513-A.-1923, duted 19th December 1894.

With reference to your lotter No. 137-A. G., dated 12th Soptembor 1894, I am directed to forward herewith a statement, propared by the Examiner of Public Works Accounts, furnishing the information required by the Government of India.

2. I nm at the same time to point out that this Government do not admit that a proportion founded on the total Public Works Department expenditure of the Presidency (excluding Sind) is a fair measure to apply to one particular class of works included in that total, and His Excellency the Governor in Council considers that any such valuation, which omits the special circustances of the class of works concerned and the extent and cost of the supervision necessary for them, is likely to prove misleading.

3. There are now in this Presidency three separate districts maintained specially for irrigation, which cost about Rs. 1,40,000 per amum, and these (Poona, Khandesh nod Dharwar) must, for the present at all events, continue to be kept up for the purpose. With a sufficient amount of capital expenditure, the general rate for the whole Public Works Department (exclading Sind) would meet the cest of these establishments, but there are now practically no capital works, and the expenditure is chiefly for maintenance of scattered works, which is necessarily more costly than the average rate for the Presidency, in which both original works and repairs are included.

4. I am to again ask the Government of India to bear in mind, the large paring, to the langeral Exchanges, which resulted from the reduction of one Ohief Engineer's office and four Executive Irrigation districts in 1897-88. I am to remark that this reduction was offested without cost to Imperial, for the reduction in the number of appointments was not corobined with a reduction in the strongth of establishment by the transfer to the Government of India of the proportionate number of officers, as was done when the Military Works were separated from Provincial, though that this was originally contemplated, is evidenced by pangraph 18 of this Government letter (Confidential), No. R., dated 20th May 1887. Had the Government of India taken over the surplus Irrigation Officers comprising one Chief Engineer, four Executive and four Assistant Engineers or granted special pensions to retire some or all of the officers concerned, the saving effected to Imperial would have been very largely reduced, but, instead of this, Provincial arranged for the employment of these officers, and this increased the saving to Imperial Funds. It is true that the changes made were accompanied by a re-organization of the Department, but this, without immediately leducing the total strength, reduced the number of the higher appointments.

5. I am to say the large benefit derived to the Imperial Exchequer, however obtained, must, in the opinion of His Excellency the Governor in Council, be considered an important factor in the matter now under consideration and it is to compliasize the moint claim to the compensation asked for that the facte have been now again put forward.

Statement showing a re-distribution of the Establishmen' Charges in the Bombay Presidency (excluding Sind) for the five years ending 1893-94, calculated in proportion to the outlay on Works and Repairs prepared agreeably to the instructions contained in the Government of India, Public Works Department, No. 187 A. G., dated 12th September 1894.

		-03,	1561-91,		1501-02.		1602-93.		1201-91. Total Establishment Charles		Arerage.	
				Total Establish-		TOTAL PATERLISH-		TABLISH- Tabors,				
Tony Heads, arc.	Charges estrulated al a propor- itonate rate.	Actual charges under ext-ling rules,	Charges la calculated s at a la calculate s a calculate s at a calculate s		Charges calculated al a propor- tionate rate.	Actual charges under calculage ral.s.	Charges exiculated at a proper- tionate rate.	Actual charges under existing suits.	Charges catculated at a propor- itonate tate.	Actual charges under existing rules.	Charger raicminicul at a priper- lionate raie.	Actual charges under existing rules.
	ile,	Re.	Ra.	Re.	Rı,	Re,	119.	Rt.	Rs.	Bq.	Re.	Re.
Imperial Irrigation Works,	1,70,921	2,48, 133	1,67,537	2,13,272	1,26,501	2,50,401	1,54,425	2,47,121	2,02,850	2,72,741	1,65,609	2,49,637
Imperial Military	2,19,491	1,70,720	£5,323	35,417	15,727	50,012	40,731	29,517	46,912	34,830	78,/31	63,882
Imperial Civil Works	23,718	10,603	33,603	27,003	37.013	50,103	81,629	27,178	61,070	43,726	94,150	20,465
Imperial - Barrack	11	6,678	18	1,100	0	1,003	21	1,173	18	1,005	15	2,076
Provincial	6,09,253	8,01,910	7,59,051	9,04,271	5,60,090	6,40,210	6,41,018	8,55,461	0,52,370	8,70,273	6,8 <b>3,</b> 6;8	8,02,039
Lacarparated Local .	2.12.037	E7,647	2,90,602	1,03,624	258,132	1, 3,820	3,27,630	1,50,411	3,16,957	1,21,677	2,71,309	1,19,416
Contribulions, etc	1,03,232	21,263	1,33,600	33,578	1,60,63	41,101	1,42,034	45,133	01,313	30, 155	1,25,770	33,894
Total .	14,37,691	16,80,001	13,53,223	13,69,522	13,11,41"	13,11,115	19,20,002	13,34,(61	19,72,003	10,72,003	13,01,787	19,01,75

2 M 2

Mr. John Tate. 21 Dcc. 01. Mr. John Tote. 21 Dec. 01. (6) Letter from the Secretary to the Government of Bombay, No. 163 A.—538, dated 21st March 1895, to the Secretary to the Government of India, Public Works Department.

With reference to your telegrams Nos. 14 A. G. and 20 A. G., dated respectively the 18th February and 6th

March 1895, I am directed to forward herewith the stutement, prepared by the Examinor of Public Works Accounts showing a re-distribution of the establishment charges in the Dombny Presidency (excluding Sind) from 1886-87 to 1883-89.

Statement showing a re-distribution of the Establishment Charges in the Bombay Presidency (excluding Sind) for the three years ending 1888-89, calculated in proportion to the outlay on Works and Repairs, prepared agreeably to the instructions contained in the Government of India, Public Works Department, No. 137A.-G., dated 12th September 1894.

•	185G-	87.	185	-98.	1899	-89.	Average.		
FUND HEADS, ETC.	TOTAL EST		TOTAL TES	ADLIBUENT QES.	TOTAL FETA	DLISUMENT ROLS.			
	Charges calculated at a pro- partionate rate.	Actual charges under existing rules,	Charges caleniated at a pro- partionale rate.	Actual charges under existing rules.	Charges ealculated at a pro- portinuate rate.	Actual charges under unlsting roles	Charges calculated ut a pro- Eportionale rate,	Actual charges under existing rules.	
•	Re.	Tis.	Re.	Re.	115,	Es.	lie.	Rs.	
Imperial larigation Works	1,95,707	3,61,478	2,15,663	2,63,562	2,14,000	2,63,053	2,03,621	3,00,358	
, Aillitary Works	1,03,250	1,63,709	1,01,141	1,37,643	1,67,012	1,60,286	1,82,421	1,61,216	
" Special Defenen Works	29,3 11	26,140	13,510	37,136	1,27,430	1,00,826	60,101	67,419	
Civil Works	37,827	31,710	60,123	63,1 57	21,032	21,017	40,992	36,861	
Berrael Departmeul	33	6,161	17	5,771	20	5,612	23	8,783	
Provincial	8,73,729	6,65,519	7,69,318	8,09,763	6,93,722	8,19,023	7,71,931	F,61,201	
Incorpurated Local	2,02,001	1,01,270	1,00,1-0	F6'01)	2,16,333	615,313	2,63,112	91,101	
Contributions, etc	57,601	11,783	29 685	10,5:1	20,171	11,710	55,100	11,329	
Tores .	15,91,121	15,91,121	11,96,316	11,67,318	15 (5,719	15,03,749	15,23,739	15,25,7 -0	

Witness.—The question of Provincialisation of these two districts is largely a question for the Financial Department. When certain districts and appointments were abolished, there was a saving of Rs. 96,000;—Rs. 1,000 Provincial and Rs. 95,000 Imperial—and this Government claimed some slare of the direct savings it had effected. It was proposed to retain the three Imperial Irrigation Districts which with Ahmednagar and Násik also Imperial, would balance matters. The Government of India, in replying, noted that this would be nafair to irrigation works in the latter districts and requested that an alteration might he made in the proposal. In 1895, the Bombay Government pointed out their reasons for the retention of the old mrangement, but said they were quite willing to after it if compensation for the loss, viz., Rs 30,000 annually, were granted. Further information was called for, but nothing further was done. This was in 1895.

## (Oral evidence continued from page 261)

- 9. Q. (The President.)—There is doubt that the establishment olarges are unfair to individual works of irrigations—They are made according to the code rules. The average establishment charges in the Bombay Presidency for the 10 years cading 1901, on all works carried out was 27½ per cent. the lowest was 2133 per cent. in 1877; the highest 296 per cent. in 1898-99, this being due to restriction of expenditure, while the cost on the Provincial works was 31:12 per cent. The reason of this and only is the large expenditure on irrigation works in Slud, which reduces the potentiago considerably.
- 10. Q. What is the percentage charged to Provincial and Imperial Funds?—It the district is Imperial we charge 23 per cent, to Provincial funds, and the halance to Imperial, and vice versā. The result is that in such districts as Násik and Ahmedangar, which are Imperial, the Provincial funds are charged 23 per cent, and the Imperial a much larger percentage. The irrigation charge is dependent on the amount of Provincial Works carried out during the year.
- 11. Q. (Mr. Higham.)—A good deal of the expenditure comes from local fauds ?—Yes; we charge local fundsonly 12 per cent and the Provincial Government meet the difference between 28 per cent and 12 per cent.
- 12. Q. You say that the Government of Bombay asked to be compensated if the soheme for provincialising the establishments was carried out?—Yes, but we received no unswer.

The reason for which the Bombay Government wished to retain the two districts mentioned as Imperial or got compensation was that they wished to keep their share of the reductions made by the re-organisation at 18-7. We asked for an additional grant of Rs. 30,000, or an addition to the rate of 23 per cent. on e-tablishment charges for works entried out from Imperial funds.

- chaigs for work earried out from Imperial lands.

  13. Q. It was suggested that the average was 26 per cent.:—Yes, there would be no difficulty if this were given. We have had no further correspondence on the subject since 1:95. In 1896 the Government of India proposed to provincialise the whole of the expenditure in the Presidency; they asked the Finance Department for their apinion, and later on a reply was received that they had no intention of provincialising irrigation in the Decan and Gujurat.
- 11 Q. (Mr. Ibletson.)—If allowance is made for revenue, the uctual expenditore would work out to about 23 per cent.—Probably 25 per cent. might be fair. I am not prepared to say exactly what, but I do think some allowance should be made.
- Mr. Muir-Mackensie to Mr. Higham.—The Government of India suggested in 1896 that the whole of the expenditure on irrigation should be provincialised. This was practically a reply to the Government of Bombuy's letter of 1895.
- 15. Q (Ur. Nighan)—Wr.have been told by some witnesses that a distinction has been unde between works called respectively. "Protectiva" and "Productive." Wo are told that the works which are called "Protective" cannot be worked on commercial principles, so as to secure a maximum revenue, because the water saust be preserved for years of drought. Are there any orders on this subject from the Government of India?—I cannot point to any orders, but there is no doubt that we do make u distinction. There are orders, I think, but whother from the Government of India or the Bombay Government, I cannot say. On "Protective" works you make as much as you oan. On "Protective" works you reserve the water for food crops.

  16. Q. I do not see what unthority you have for the
- 16. Q. I do not see what unthority you have for the distinction P—I cannot point to any order, but it is the general practice. On the Nim canal sugar-cane is restricted because it is n "Pioleotice" work.
- because it is no Protective work.

  17. Q. We have heard of various irrigation projects; what is the present slate of the Maladers and Chankaputanks?—The Maladeri project has come up to the Bombay Gavennment in a complete state. It has gone back to the Superintending Engineer for revision and for repor on certain points.

- 18. Q. Do you propose to recommend the project for sanction?—When we got the information, if the results are satisfactory, we will recommend it. The project has already been reported on by the Revenue officers very satisfactorily at various stages. Mr. Mair-Mackenzie himself reported on it at great length.
- 19. Q. I believe the Local Government are still doubtful, as to whother it should be a protective or preductive work do you know whether they have made up their minds?—So far as the Public Works Department is concerned, we shall recommend it as a protective not a productive work.
- 20. Q. What about Chankapur?—It has gone back to the Superintending Engineer for revision; it is with him at present. The plans and estimates were submitted 2 or 3 years aga, but the Government of India asked for certain further informatioe.
- 21. Q. Has the question of the canals proposed in connection with the Inpti and Sabarmati been before the Government in any definite form P—Not lately, the papers are before us.
- 22. Q. They are old proposals revised again. Are they in any definite form before the Government !—Government have called for the papers, and a report on the projects was submitted some time ago, but they have not yet decided what should be done.
- 23. Q. The Wokak Canal, you say is the only Provincial Canal in the Bowbay Presidency ?—Yes, but we do not consider it as constructed for irrigation purposes. A lease was granted to a Compusy many years ago by Government for the supply of water to the Gakak Alills. Government has undertaken to supply their requirements.
- 24. Q. But the Mills do not pay very well for the water?
  —That is so, but we are bound to supply it.
- 25. Q. A good deal of the water in the Gokak River goes to waste, could not some of this water be used for irrigation?

  There is great made in the monocon, but the reservoir ran dry last year in the hot weather for some weeks, and we were unable to supply water in the Company and were liable to chains for compensation, but they did not press the
- 20. Q. I think Mr. Be de has a project for considerable extensions of this work, which we are going to see ?—Yes, Mr. Bedo has three alternative schemes, the estimates of which are over 91 lakks.
- 27. Q. Do you know anything of these schemes?—No; they have not been before the Government in my time. They have been made out by Mr. Bodo from information and inquiries he made locally. I know of the proposal to raise the weir, but it has not yet been finally considered.
- 28. Q. Were there any proposals sent up to you for completing lanks or other irrigation works, which had been undertaken for famine relief?—We have been urged to complete two works, one in Sholapurand the other in Natik. The Sholapur work will cost its. 1,22,000. The present consideration is, what to charge it to. It will be partly for the water-supply of the Bari Municipality. At present, I see no justification for completing the tank as an irrigation work. We have asked for further reports on these two.
- 29. Q. Haro you any other works in other districts that it is desirable to complete?—For the present, we are a king for one lath of rapces in a lumpaum to be expended on such works, as it is considered desirable to complete. When we have decided which should be completed, we will apply for more.
- 30. Q. (Mr. Ibbetson.)—I understand that the whole of the water-rate is credited to Imperial Funds?—Yes, with a deduction for collection.
- Sl. Q. What proportion of the Land revenue? Three-fourths. I think it is three-fourths of the consolidated rate.
- 32. Q. You have two ways of realizing revente, one is a water-rate, and the other a land rate. Is total cess charged on the water-rate f-No.
- 33. Q. On the consolidated rate? —I cannot tell. If the cess is not realized by the Provincial Government on the water-rate, it is to their interest to charge the consolidated
- 34. Q. (Mr. Rajaratna Aldir.)—Local cess is not charged on the Nira Canal?—Yes.
- 35. Q. (Mr. Ibbeleon).—We have been told that the proportion of the lotal land revenue credited to nator should be higher than it is f—I have no intimate knewledge on the subject except as regards Sind. I do not know as regards the Decoun.

- 36. Q. You have just told as about the system of dobit which obscures facts as regards individual works. On a large number of new tank works, the working expenses ero shown as Its. 3 an nore all round; but, if the actual working expenses were taken, the charge would amount to Re 1 or Rs. 1-8-0?—No, the difference would not be so great. Only in some districts in the charge abarrmal, Its. 3 or Rs. 2-8 is more likely the figure.
- 37. Q. It is almost an accepted fact that establishment should be charged to tanks and protective works so as to relieve reads and buildings. Do you know of the existence of any orders to that effect?—The orders are that in a District 23 per cent. is charged to Provincial and the balance Imperial to Imperial and vice rersa. It is not possible for the Executive Engineer to make any difference; he has no power in the motter. It lies with the Examiner of Accounts, who makes the proper apportionment.
- 38. Q. You say all irrigation in the Presidency is Imperial, except the Gokak works; do you include the small tanks?—Yes, the expenditure on them is Imperial.
- 80. Q. You say that theiguestion of provincialization of irrigation is mainly one for the Finance Department to consider; would not the fact that the Provincial Government had a direct pecuniary interest in extending the efficiency of Irrigation works current more attention being paid to the works?—I do not think any more attention would be possible than is given now, whether the works were Provincial or Imperial. Our hands are tied by the maprofitable nature of the works. At present they may maintained at a loss. There is no difficulty in getting money that can be usefully spent.
- 40. Q. Is that the case as regards Miner works?—There is not much difference as regards grants for Major or Miner works. We certainly have no difficulty in regard to productive works.
- 41. Q. We have heard a good deal of talk about the failure of Government to fulfil its responsibility of clearing out the tinjarat rice tanks: if you had asked for money, would you have got it?—It was not a case of want of money. We never asked for large sums: we could have got more money.
- 42. Q. (The President.)—We were told that you never spent the rooney you had at your disposal?—There certainly recre difficulties in the way which I think were mainly due to the orders that preference should be given to those cultivators who made a 10 per cent, contribution towards the repairs of their tanks. There was no difficulty about spending the money. In some places tanks were not taken up till the cultivators said they would pay contribution and petitions were sent in. The works for those willing to pay the 10 per cent, were scattered over a big area. It would be easy caough to take up the trucks in one locality and finish them off, but it is difficult when precedence has to be given to scattered tanks willing to pay 10 per cent. It is not a fact that the dulay in the budget sanotion was any difficulty. When I was Supprintending Engineer, Northern Division, I knew the sanction would come and I gave instructions that money would be available and that they might assume accordingly. Same such order was made to the Executive Engineer, and I informed him of what the proposed allotinent was.
- 13. Q. (Mr. Ibbetson.)—Is the 10 per cent, rule a good one? Is it worth keeping up?—I think it ought to be done may with, null the rates increased to compensate Government, if necessary.
- 41. Q. With regard to the Chankapur Tank, the interest charges are almost as much as the Capital outlay, the figures being Rs. 60,000 cost and Rs. 49,000 interest, can you tell us the cause?—I canuot loll at this moment. It was sanctioned and under consideration before I became Ohief Engineer.
- 45. Q. We have been told by the Executive Engineer for Irngation, Poons, that he has no knowledge of the fluorelat results of his work, largely on account of the artificial establishment charges ?—I have always considered that no Executive Engineer should judge the result of his work by the number of nores irrigated; the more irrigated the botter.
- 46. Q. Is credit given to the Excentive Engineers who obtain the best results ?—The Excentive Engineers are given credit for it in the reports.
- 47. Q. Supposing one man has a small area of high paying crops, and the other a greater area but low paying crops, the area would not be the correct measure?—No.

Mr. John. Tate.

Mr. John Tate. 21 Dec. 01

- 4S. Q. Do you think it would be feesible to reconstruct the Irrigation Department in the Bambay Presidency ?—I certainly think that in Bombay we should have a Chief Engineer entirely for irrigation, one man cannot properly look after the whole Presidency.
- 49. Q. From the lessone of the past five or six years, do you think there should be some separation. —I think same relief should be given to the presont staff. If the department is entirely separated, the cost would be enarmans. Temporary separation may be made, while works are heing carried out; but I do not think that the existing irrigation works are sufficient in number to justify sutirely coparate Excentive establishments.
- 60. Q. Have famino programmes been prepared for all districts liable to famina?—We have been living from hand to mouth an existing programmes; but we have made new programmes as far as possible.
- 51 Q. Are there any districts in which famine has not occurred, but for which programmes were prepared?—Yes, the Konkau. In the Konkau there has been no famine for the past five years.
- 52. Q. Havo the Konkan programmes been revised lately?—Yes, at the beginning of the last famine. I think they are nevised every six manths.
- 53. Q. Is the Forest Department concentred as to whether they could eaggest famine works?—Yes, certain forest works are included in all the programmes.
- 54. Q There are large forests and alariginal tribes in the K kan?—Yes, but they were not affected by the distress.
- 55 Q. How are the repairs of the small tonks in Gujarat carried ont; are they repaired?—We do repair them from time to time, when the Executive Engineer has decided which of them are to be repaired. He is ordered to review them every five years or so, and report on their state.
- 56. Q. Mr. Lawrence told us that there was a proposal to legislate in order to compel the people to keep these tanks in repair?
- Mr. Muic-Mackenzie: -That proposal has been aboutdoned for the present.
- 57. Q. (Mr. Rajaratna Mdlr.)—You refer to the subject of making the Irrigation Department separate, how many Seperintending Engineers have you got now?—Five, excluding special men.
- 58. Q. Considering the small number of men on Irrigation works, would it be possible to reduce the number and put some on irrigation projects?—I don't think so, as the Eogineers in some instances have local works as well as irrigation to superintend.
- 59. Q. I want to know if you can make three Divisions and spare two officers?—No, it is quite impossible. We have two officers in Sind where we had formerly only one. And they have quite ns much as they can do and race.
- 60. Q. As regards tank works, you said you had no difficulty in obtaining money for repairs. We find that very little money has been spent in the last 25 years in regarding these minor tanks in Gujarat. Why, so the money was available, was so little spent on their repair?—I don't man that we could get an unlimited uncount of money. We get what we wunt, but we have difficulties in epending it.
- 61. Q. In Mr. Beale's report, the working expenses as givan are said to be fictitious?—They represent a share of the actual establishment of the district calculated on the 23 per cent. basis for provincial works.
- 62. Q. How does it compare with the actual expenditure?—There is no way of finding out. The Examiner takes the total expenditure of a district. If it is an Imperial district, he dehite 23 per cent. to Provincial, and dehits the rest of the expenditure to Imperial.
- ${\it c3.}$  Q. Is there no record of the actual expenditure on irrigation  ${\it P-Nu.}$
- 64. Q. (Mr. Muir-Mackenzie.)—It is a generally accepted union that protestive works should be unnaged by reserving a certain percentage of the water for fool crops?—Yee, but I have no special orders that I can point to.
- 65. Q. The particulars of such works have been submitted to the Gavornment of Iudia P—Yes, the Nira project was prepared with the intention of ite being managed as a protective work. There was a trait understanding with the Government of India that the Nira Canal would be werked as a protective work.

- Mr. Higham.—You cannot produce any Government Resolution in which these orders were cantained, and I am sure that na such restrictions were intended or conveyed by the Government of Iudia.
- Mr. Muir-Mackenzic.—I do not wish to ergue the paint, hat that is the fesling on the cubject.
- The President.—If the Bombay Government think that they are tiad down to that view, I would suggest that they shauld communicate at once with the Government of India.
- 66. Q. (Mr. Muir-Mackensie.)—In regard to the Maladeri tank, how lang have the plane been with the Superintending Engineer?—Not very long. We kept them hach a little as a matter of fact, as I wanted to lay them before the Commission, which wa thought was coming here earlier. We found that the figure had not been eigened by the Superintending Engineer, and same information was wanting and so they were sent back to him.
- 67. Q. (The President.)—You may be earethat, if it has a good reservoir, the scheme will be backed up by this Commission?—It is a good scheme; the only question is, whether it will pay.
- 68. Q. (Mr. Muir-Mackenzie.)—As regarde the completion of wark began in the Fumine, should not nil the warks be completed which would pay interest and warking expanses on the cost of work necessary for completion?—You have to put in the finnine labour.
- 69. Q. Leaving ont the famine labour, would they pay interest and the working expenses?—I can see no abjection ta that except, that it will leave na work for a future famine. If thay would pay interest an the further capital expended, I think it will be a wise plan to complete them. But having regard to their protective value, I da not think it would pay to complete them, if they only pay their working expenses.
- 70. Q. If any irrigation work does good to the villages close to it, there can be no doubt that the villages under its influence are better prepared to resist famine. It has a protective affect upon the villages. We have to bonsider that protective effect; it is not a question of money, i.e., whether it would pay or not ?—It is difficult to estimate the protective value of works. In selecting works, we expect that they will ut less pay their working expenses; hat I doubt if the protection is worth the money in many cases.
- 71. Q. With all the experience you have had with regard to famine labeur, do you think there is any better way of employing it than ou tanks and canals?—I think metal breaking is decidedly inferior. Tanks, whether they pay or not, are better. The metal broken may not be of any use: the tanks always will be of some.
- 72. Q. Do you see very much scape for road-making with famine inbour?—No doubt, many roads could be made, but where is the maintenance to come from.
- 73. Q. Many of the roads were made in old times before the railways were built; could not new roads be made to feed the railways, and the old ones be abandaned?—That is a point I have not considered.
- 74. Q. You said to Mr. Ibhotson that we'had been living from land to month with regard to finalise programmes, would it be worthwhile, oven at considerable expenditures to have programmes of tank works prepared with full plon, and estimates sanctioned, so that, if a future fuming came upon upon upon upon upon the work could at once be undertaken with famine labour?—I think special urrangements will be necessary to prepare programmes for future famines. Before the last fumine, the Public Works Department was just recovering from the effects of their work in connection with the famine of 1836. Varians proposals were made. It was proposal that an Executiva Engineer should be put on epecial duty to complete projected works, but before unything could be done, the last famine came upon us, and we had no time to do it. I consider it very necessary that we should, in future, have a special establishment to prepara famine programmes. Without this, I do nat see how it is to be done.
- 76. Q. De you think that irrigatian works require special consideration?—I consider it a class of work to which preference should be given.
- 76. Q. You think the programmes when made should be carefully examined?—Yes, it is very impartant; but the question of cost has to be considered. At present the ent of survoye is dehited to ordinary fauls, and not to famine relief.
- 77. Q. You have at present an Engineer carrying out epecial surveys. His services will have to be charged to

irrigation, but you will have to get a special grant before you can do that?—I cannot charge his services against 83, all his expecditure is charged to 85.

- 78. Q. (Mr. Ibbetson.) Has not the Secretary of Stat ordered such survoys to be obarged against famins (No. 35)?
  —No such orders hove as yet been received by me, but I have heard that there is such an intention.
- 79. Q. (Mr. Muir-Mackenzie).—There are other charges too, for which we have to go to the Government of India?—At present a list is being prepared which shows that S or 4 lakks are required for hand compensation tharges, partly for irrigation and partly for roads and railways. The Local Boards have no funds to meet their share.
- SO. Q. It was suggested by one of the papers that there was unnecessary delay in taking up land. When you have definitely decided on a certain site for a famine project,

why not take it up at once and re-lot it to the late owner, so that there should be no delay in starting the work when necessary ?—I have not heard of any delay, if there was ony we could meet it. There could only be 15 days' delay, as notice under the emergency chanse of the Land Acquisition Act empowers us to take it up at once.

81. Q. One of the witnesses soggested that the land should be token up at once as it might go up in value. What do you think of terracing the country with thats:—I suppose you meen Mr. Joyners' proposel. Yes, it was considered; but it was thought that for large works under the Public Works Department, it was undersirable, os the lobour on it would be difficult to control, and there were other difficulties which prevented the Public Works Department from toking it up. It would be good work, if you could get over the promistary rights. be good work, if you could get over the proprietary rights of the people.

Mr. John

# WITHES No. 62 .- Mr. K. R. Godnote, Excentive Engineer, Public Works Department.

### Answers to printed questions,

I am now on long leave, and connot therefore make any official and lacel enquiries and obtain the requisite detailed official and lacel enquiries and obtain the requisite detailed infernation for answering the questions proposed by the Indian Irrigation Commission. I have also no ules, returns, reports, or statistics to refer to, and will therefore give below such general information about irrigation in Shelapur district as I think likely to be useful. My evidence will relate mainly to the Shelapur district, where I was working as Executive Engineer in charge of the district for Olycais before I availed myself of my present leave. Detailed information regarding rainfall, present and proposed works, irrigation distribution and control, crope, waterings, outturn, cost, etc., while forthcoming from the written and oral evidence of the present Executive Engineer of the Shelapur district. Sholapur district.

- 2. The Sholopur district is situated in the dry zone of the East Decran, and is one of the first districts in the Bomby Presidency to be affected by famines and seasons of scarcity. Its rainfall is prorations and uncertain. Very often it fails at end of the khorif and rabl seasons. Such failures tend to the partial or total failures of crops, and bring on seasons of famine and distress.
- 3. The culturable soil of the district is mostly peor, being a top-layer of bronu or black clay averlying muram and rock below. The top-layer of brown or block soil varies from 3 inches to 2 feet in depth. On the banks and in the valleys of anna and rivers the soil is rich block, but the exlent of such land is not considerable.
- 4. The district is troversed by the Great Indian Penhisula Railway, and there will be soon another narrow gauge line between Paudharpur and Kizam's Frontier vid Barsl Towa. There are good means of intercommunication by roads also. There is no immediate necessity of farther road communication in the district.
- 5. The only means that remain to be token up now for protecting the district ogninst fornines and seasons of scarprotecting the district ogninst foning and scarns of scar-city consist of the development of irrigation works. These should be extended as far as practicable. There are two rivers in the district, namely, the Bhima and the Seens. But they are not favourable for conal irrigation, as the water-supply in both is not perennial. The river bunks are also much broken up by high mutam ridges which approach almost to the liver edge at short distances aport. Such con-ditions are not favourable for nickens weigh with consisditions are not favouroble for pick-up weirs with causle starting from the same.
- 6. It may perhaps be precticable, however, to construct a weir on the Nira river below its confluence with the Kara river, and take a left bank canol from the same for irregating the Maksiras taluka of the Sholapur district. The canol will pick up the waste water of Kira Canal after it has done its duty. The discharge of the Nire river at the site of the proposed weir will probably be considerable, even in the hot weather, on account of the construction of the Bhatghar Reservoir and the poremulal trigation on the Nira Canal. I throw out this suggestion for further consideration, and for development of the project, if the sorns sideration, and for development of the project, if the some be found to be fersible.
- 7. In the absence of perennial rivers in the Sholapur district, the only closes of irrigation works practicoble are irrigation tanks and wells. Four irrigation tanks have already been constructed in the district, all of which have been foirly successful. They have more than paid their working expenses, and have been the means of roising large

quantities of food stuffs and fodder in years of scarcity and famine. In ordinary years they have been the means of raising high class and paying crops. The growth of these crops has mised the stotus of almost all irrigators. All the irrigating villages under the tanks have theired, and become almost nucleondent of Government assistance in times of famines and distress. times of famines and distress.

- 8. I strongly advocate the construction of as many irrigation tanks as practicable in the Sholapur district. The only conditions for tank works undertuken by the Stote should be that the entchment area should be not less than should be first the entchment area should do not less vann 12 equare miles, and that the fank when completed should at least pay its working expenses. Tanks with large catchments should be given preference first. But in the absence of sites with large catchments, I would occept smaller catchments rather than not construct the tanks. There is a considerable number of sites in district with catchments of the convey miles and upwards. catchments of 12 square miles and upwards.
- 9. In years of scarcity and insufficient rainfall the tank with smaller extchments will not fill, but the direct and indirect advantages derived from them in ordinary rainfall years will more then compensate for this drawbock. Even in bad years the tank will hold some water which can be very profitably used in the saving of the ordinary khorif and robi cultivation under command. It frequently happens in the Shelapur district that ordinary kharif and robi crops thrive well in their initial and middle stages, but wither and are lost for want of one or two raiofalls in the cud. Such crops, if under commend of the irrigotion tanks, I advocate, will be saved by giving one or two waterings for the tanks. The stored water required will be small, but the value of the crops saved will be very great. 9. In years of scarcity and insufficient rainfall the tank
- 10. I give below the several advantages that will be obtained by the construction of the irrigation tanks I refer
  - (a) In ordinary rainfall years all the tanks will fill ond carry out the objects for which they have been designed. In very bad tainfall years the tonks with smaller entelments may not fill, but even in these years they will hold some water which can be most advantogeously and profitably used in the soving of ordinary pharif and rabi crops under command by giving one or two waterings.
  - (d) The tanks will be useful for water-supply for men and cattle. This is a great desideratum in a dry district like Sholapur.
  - (c) They will raise the sub-soil water-level of the ndjoining country. This raising will extend all round the tank nurgin and for 4 or 5 miles below the tank dam. This will be a great advantage for lift irrigation by mean s of wells.
  - (d) Large and thriving plantations of babul wood and other fuel trees will spring up round the margins of the tnuks. This will be a source of income to the State, and will increese the Inol supply of the district.
  - (e) The protected vilinges under the tank will become independent of Government assistance in times of famine and distress. The condi-tion of the irrigators will improve to such an

Mr. R. R. Godbole.

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extent that they will not resert to Government relief works, or ask for other help from the State in times of famine.

(f) The tanks will provide a considerable extent of grazing round their margins and on cannis for cattle in the neighbourhood.

11. In tracts where irrigation tanks and oanals are not practicable; the construction of wells should he freely encoraged. The wells should first he excavated to waters beering strata and enlarged if successful. Government should not attempt constructing wells hy their own agency in private lands. The construction should he left to the holders of the lands themselves, who very well know how and where to construct the wells. Government assistance should be confined to unking "tagai" advances on as easy terms as practicable to the using of derricks and boring instruments, and to the undertaking of dynamite blasting when required. The using of boring upparatus and dynamite blasting can be carried out by Government or Local Boerd professionel agency at the expense of the agriculturists concerned.

12. An irrigating well in the Sholspur district, capable of working one "mot," with a masonry pletform for one "mot" only, can be constructed at an average expenditure of Rs. 300, and it will irrigate about 3 acres all the year round.

13. The only income obtained by Government at present from the irrigation works is from the sale of tank and cannl produce and from the sale of the tank water. The lands under command have the great advantage of being protected by the irrigation work, that is in a season in which the rainfall is insufficient and untimely, the occupant her got the great convenience of taking cannl water and of saving his crops. He pays for the water when he takes it, but for the potential advantage that his land enjoys on account of the construction of the Government irrigation work, he pays nothing. In revision settlements, the Settlement officers will probably cahance the land assessment on account of the irrigation facilities and protection herein referred to. If there is such an enhancement of reveaue, due to the construction of the Government irrigation work, the work shanld, I thunk, get a book credit for it. This is a matter that is worth consideration during revision settlements.

ments.

14. The present system of ascessing revenue charges on an irrigation work is, I think, faulty. The correct system would be to take the actual cost of repairs and maintenance, ond to add a certain fixed percentage to it for cetablishment charges. The porcentage should be 12, being the same as debited to Local Board works. Instead of such a procedure the revenue accounts of irrigation works are debited at present with very heavy establishment and book charges, and the result is that the works are shown as not paying, or as being worked with a loss. The rules on this subject should, I think, be re-considered.

15. The demnnd for water in deep black soil is generally much less than in the case of other soils, and in ordinary rainfall years the black soil fields require no assistance from irrigation works, so far ns ordinary crops are concerned. In the Shelapar district, however, irrigation is sought after for all kinds of soils whether rich, black or light. In black soil plains it is required for the irrigation of sugarcano, fruit-trees and other valuable crops. The Shelapar people are auxious to obtain water for irrigation purposes everywhere. But in black soil areas it is not likely to be used to the same exteat as in the case of the other soils. Preference should be given therefore to the command of lighter soils in selecting sites for irrigation

16. Small tanks constructed in black soil oau hold water like other tanks in the district, if sufficiently deep puddle trenches are provided below the impounding dams. High dams cannot be made of pure black soil. There should be an admixture of maram or red or yellow earth with the black soil, the dam materials will swell with rain and moisture, and the swelling will lead to cracks and slips. The earthen dams in the Bemhny Presidency are made of mixtures of black soil ond muram and covered with a casing of maram on all exposed faces. No masonry core walls are necessary for earthen dams, if edequate concrete and puddle trenches and drainage gutters are provided under the dams for preventing leakage and water-logging.

·17. There are no villago irrigation works in the Sholapur district like the bandhoras in Nasik and Khandesh and the irrigation tanks in Dharwar and the Southern

Maratha Country. It is desirehle to have such village works hut I do not think there is any chance of their bong constructed in these days, as is it impracticable to get the villager to co-operate to the requisite extent in getting ap the required funds, and in abiding by the rules regarding the up-keep and repairs of the works when comploted. A large private land-owner may consistently come forward to construct a small tank for a hhandhara and channel. If such a man comes forward, he should be freely encouraged by Government to carry out the work by giving him facilities for acquiring the required land and for collecting reuts for water which he mey give to other cultivators.

18. I nm not in favour of constructing small village tanks in the Shalnour district, naless adequate arrangements are made for their np-keep and meintenance. Some tanks of this character were made in the famine of 1876-77, hat most of them here broached and ere now in ruins. That works caanet irrigate lands, but they will be useful for water-supply for washing and village cattle. They will also raise the sabsoil water level of the adjoining lands. The only ungousy that can be entrusted with the repairs of these village tanks is the District Local Board, but that body is too poor to undertake this additional responsibility. The Board can hardly get the required funds for keeping up the district reads in repair. I am afraid that under these circumstances the village tank construction must be shoudened. The works are so small and of such limited utility, that it is not desirable to expend any Previncial or Imperial Funds upon their repairs, oven if they are constructed from famine funds. The village tanks will generally dry up in the Sholapur district at the ond of January, and they will be empty in the lot weather when they are wanted most.

19. There are no obstacles to the extension of Irrigation in the Sholapur district arrising from scanty population, insufficiency of cattle, unsuitability of the soil, lack of capital for initial expenditure or other reasons. There is want of manare in outlying villages, but this want will bave to be applied, as irrigation progresses by importation from outside. There is a good deal of night-soil, poudratte and other good manare available in the neighbourheod of cities like Sholapur, Paudhorpur, and Birsi.

20. Extension of irrigation will have no teodenoy to injure the remaining coltivation of the district by drawing away copital and labour from the latter.

21. There are complaints under the older irrigation works in the district of lands heing improverished by constant irrigation, but this is due to want of maunre and want of rotation. The same hand is often irrigated year after year with similar crops, and impoverishment is the consequence. There are no other complaints regarding damage to irrigated lands or to the inhabitouts of irrigated villages.

22. No drainego works are required in the Shelapur district, as the whole of it is noturally well drained by unlas and rivers. There is no water-legging or had thrown out of cultivation on its necount. In prigoted are a slate there is no necessity for drainage, as the lands Irrigated mostly have marked at a small depth for their sub-soil.

23. The famine relief works carried out in the Shelapur district in 1896-97, 1899-1900, 1900-1901 famines consist of

- (a) Roads, road repairs and improvements and metal collection for roads.
- (b) Earthwork for now railway lines and ballast collection for existing railways; and
- (c) Construction of irrigation tanks and repairs of existing irrigation works.

Fortunately in the last two out of the three famines the bulk of famine works expenditure was on closecs (5) and (c) above.

The following six new tank works have been started as relief works in the Sholapur district and are still incomplete:—

- 1. Budibol Tank.
- 2. Bhamburdi Tank.
- 3. Pathri Tank.
- 4. Wadsbivno Tank,
- 5. Hudgi Tank. .
- 6. Maagi Tank.

Of these, I strongly advocate the early completion of the first 5. If completed at an early date they will add to the irrigated area of the district and protect considerable area from droughts and distress consequent on seasons of

soarcity. Nos 3 and 4 (Pathri and Wadehivno Tanks) must be completed before next raine, as their feeder nelas have been builded up, and temporary waste weire have been provided instead. These temporary waste weirs will develop into river-bods next rains, if not immediately closed and rendered unnecessary by the completion of the works us designed. Nos. 1, 2, and 5 are very useful works, and should be completed at an early date. No. 6 (Maugi Tank) is a useful work, but unfortunetely the area nuder its command is limited. Its completion can therefore wait until the completion of other more remunerative adhemes. six tank works under reference will much more than pay their working expenses when completed.

24. The water-rates charged are crop rates which are sanctioned by Government from time to time on proposals submitted by local Irrigation and Revenue officers. The sanctioned by Government from time to time on proposals submitted by local Irrigation and Revenue officers. The scales of water-rates are generally fixed for three years. The areas of irrigation of crops are accessived and assessment returns prepared by the Irrigation Department twice in a year for the kharif and sabi seasons. They are then sent to the Revenue officers for callection of irrigation revenue along with land revenue. Water applications are received for the crops to be grown, and when sanctioned water is given to the irrigators mutil the crops mentioned come to

maturity. The distribution from the main and branch canals and from larger distributaries is in the hands of Irrigation officers. After the water leaves the main canal and branches, the irrigatore manage the distribution amongst themselves according to tarns fixed by the Irrigation Department and under sapervision of Irrigation officials.

25. In years of favourable and timely rainfall, canal water is not taken fer ordinary kharif and rabi crops, and the extent of irrigation and irrigation revenue fall in conseextent of irrigation and irrigation rovenue fall in consequence. In years of good and timely rainfall it cometimes happens that the storage in larger tanks is not fully utilised in irrigating porennial, eight months', and hot weather crops. Some of the stored water remains in the tank for use during next year. In the case of the Ekruk Tank some witer has always to be specially reserved in the tank ut the end of the year, as the water-supply of the town of Sholepur and of the factories established in it is dependent upon the tank. Any year may turn out to be a had and rainless year which may not bring any replenishment into the tank. year which may not bring any replenishment into the tank. To gnard against the contingency of such a year, it is necessary to keep sufficient water into the tank at the end of the year to meet the water-supply wante of the town doring the succeeding year.

- 1. Q (The President.) You are an Executiva Engineer, Public Works Department? Yes; I am now on leave. I have been eix years in Sholapar. I was there on duty I have been six years in Sholapar. I was there on duty during the last famine. I have been 23 years in the Department, and remember the famine of 1877.
- 2. Q. Much of the Scholapar district is irrigable by tanks and wells?—Yes; but these tanks generally depend on local rainfall. When the smaller tanks heve been dry, I have seen the larger ones holding water, even in a year of bad minfall. I say this from my experience of the last two years. of the last two years.
- 3. Q. With regard to wells, Government assistance would be confined to making takevi advances: do you think the torms should be made endor? I would propose a longer period for replyment. I would make it 30 years, and toperiod for repayment. I would make it 30 duce the rate of interest from 5 to 4 per cent.
- 4. Q. Supposing a wet assessment was put on the well instead of saking for a return of the takavi "-I don't talak the people would like that.
- 5. Q. Not even if they got the money for nothing without interest?—No.
- 6. Q. Is there much difficulty in sinhing wells in your district?—They are easily made; but it is difficult to get water, because the soil is 2 or 3 feet thick; below that there is murum, and below that again ruck. You have got to get to the heart of the rook and to a soft layer.
- 7. Q. What does ench a well cost? About Rs. 300; but if the water is found soon, much less.
- 8. Q. Those are kachcha wells !- Yes. They last for 80 or 40 years with slight repairs.
- 9. Q. In paregraph 14 of your note you refer to the present system of establishment charges?—Yes, the cetablishment charged to irrigation works is too high. The maintenance charges are also high, too high. Ordinary maintenance of irrigation works does not require much professional and the profession works. sional knowledge, and could easily be entrusted to a lower paid establishment.
- 10. Q. You say that in the Shelapur district, irrigation is used for all kinds of soils. How deep is the thick black cotton soil?—Near the rivers, and nalas 8 or 10 feet; in other places 2 or 3 feet. When I say all kinds, I mean ovon for sngar-cane.
- 11. Q. In paragraph 18 of your note, you say thet you are not in favour of small village tanks in Shelapur, unless adequate arrangements are lande for their up-keep f -Yes, aomo amall tanks in the Sholupur district wore mado as famino works, and are out of use; some have been breached on account of insufficient waste roirs. The tanks were constracted, and no one was placed in cherge of them; they were chiefly for cattle and drinking water purposes.
- 12. Q. Do you think motal broaking a good form of famine relief?—No, not unless the metal is really required for roads, and you can use all that is broken.
- 13. Q. With regard to the four tanks referred to in your note—in bad years they would not fill, but in good years rould they fill?—They are not situated on perennial streams, and we cannot connect them with the glats, as Shelspur is on a high plateau. I think they would not all in very had

- 14. Q. (Mr Higham.) You say that the Bhama and Seems are not feasible for causls, as the water supply is not perennial; the Bhemn comes from the ghats, does Ves; but even if storage reservoire were put up, the weter would have to be carried 100 miles down the Bhoms, and in traversing that distance half of it would be lost.
- 15. Q. The Bhema is rocky in some places, and sendy in others; do you know whether there is rock under the sand?—I do not know. It gots dried up during the hot weather; the supply falls in April or May, though sometimes it flows perennially.
- 16. Q. Why do you say half the water would be lost in transit to the count?—As Assistant Engineer. I took observations of the Pravara river in connection with the Maladeri tank, and I found that in about 40 miles there would be loss of 25 per cent.
- 17. Q. Is that ou record P-Yes, it is most probably filed with the other records.
- 18. Q. Do you know of any other observations of a similar kind?—There were similar observations in regard to the Bhntgarh tank on the Nim canal. I have not taken observations in regard to the Bhema
- 19. Q. What about the Scenn?—That has its rise near Ahmednagar. The country in the Shelapur district is most uninvourable to irrigation. There are ravines round about, and outting would cost a los, while the area commanded would be smell.
- 20. Q. Could not high weirs be adopted?—On the Seena river I tried to get altes for pick-up weirs, but could not get any. The banks of the river vary from 10 to
- 21. Q. You s uggest that the waste water from the Nira might be picked up, how do you know that there is nny?—There is bound to be was water, as the water must retern to the rivers. I have taken no observations. I took some observations in Khandesh, where we have the Panjra interestion. It consists of a number of weirs seale of which irrigation. It consists of a number of weirs, each of which irrigates a small block. Wo let the water out to feed the land under the bandharas, and it comes back to the river.
- 22. Q. Cao you say from your own knowledge that there is waste water ?-I cannot say.
- 23. Q. You say you would not make tanks with less than 12 square miles extehment?—You, the cost of construction is smaller with larger extchments.
- 21. Q. But the larger your estelment the larger the capacity of your tink?—Yes; but if we atore a small quantity of water in a large tink, there will be mach less from evaporation. It is heavy in Shelapur, about 5 or 6 feet in the year. If you have a small tank, the spread is
- 25. Q. Supposing you design a tank to hold 100 willion onbio feet and you have a cortain catchment area; if you have abort min, you got only 50 million ouble feet; and if you have a smaller tank, you got only 25 million f—That woold depend on circumstances.
- 20. Q. I imegine your objection to small tanks is that the cost of storage is greater compared with a large one? You say that if you make these tanks, the villages in the vicinity will become independent of relief ?- Yos, we

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- Mr. K. R. found this to be the cass under the Ekrek, Ashti, and Godbole. Koregaam touks. In regard to all these, the villagers came in, but in very small preportious.
  - 27. Q. You mean; some came in, but not the oultivator class?—The cultivator class cams in when the famico had reached a serious stage and the tanks ran dry.
  - 28. Q. The big tanks, as a matter of fact, did a ot fail in their supply ?—Only the Koreganu failed. It has a catchment of hre square miles. Vsry few enlivators from there weut on relief works.
  - 29. Q. Supposing new wells were made, do you think ley would be worked regularly or only in famine times is they would be worked regularly.

    They would be worked regularly.
  - 30. Q. Whot is the average lift?—The average lift would be about 25 test.
  - 31. Q. Are the people deterred from building wells by the first cost of construction?—Yes, in the poorer talakas.
  - 32. Q. But the people depend on the ordinary rainfall?
    On the ordinary rainfall and wells; they would work wells if they had them.
  - 38. Q. You think the cost of maintenance might be reduced?—Yes, I would devise sums means by which the establishment would be reduced. I would had over some of the works to the villagers.
  - 34. Q. In the Sholapur district, your establishment charges are small?—In Koregaum the revenue and expendituro are about the same.
  - 35. Q. You say carthon dams can be made 70 or 80 feet high?—The Ekruk dam is 76 feet high, but it has slipped in places. The sub-soil gets water-logged whom the drainage is technical. The Asha tank is also giving trouble, which 18 dun to the same cause.
  - 36. Q. Have you any earthea dams that have not given trouble?—Almost all hove given trouble.
  - 37. Q. In regard to villago tanks which you do not recommend, are there not some worth repairing? Yos, they would make good famine relief works.
  - 38. Q. The soil of Shelapur, what is it like?—The soil is mostly brown light soil; it overlays a bed of muram.
    - 39. Q. Is it permeable to water?-Yes.
  - 40. Q. With regard to the tanks which, you say, might be finished as they are half completed, what are they?—
    The Pathri and Wadshivuc.
  - 41. Q. You have had famino labour employed on these tanks for nearly two years ?—Yes, as many as we could get. On the Pathre we could have taken more, but the famine was not severe there, and we had less labourors.
  - 42. Q. Supposing you had ordinary laboar and put as many mea on as you had famine labour?—The smaller works would have been faushed.
  - 48. Q. Do you think that from the local villages, from which labour came, the men would have some to work for a contractor?—No, in ordinary years tany would not have come in sufficient numbers to complete the work. Even professional labour would not have been sufficient to make any material progress with all the tanks.
  - 44. Q (Mr. Ibbetson.) You say in your memorandum that tauks will affect wells for 4 or 5 miles?—I have noticed that not only close to the mila, but within half a mile on both banks.
    - 46. Q. In famine years do they benofit ? Yes.
    - 46. Q. How far?-Within half a mile.
  - 47. Q. I understood you to say that tooks do not pay the interest on their oust; that they just cover working expenses and some pay I per cent.?—The new tanks will only pay their working expenses.
  - 48. Q. These tanks which are half finished by famine laboar, if the cost of the famine labour was set eside, would they pay on what it would cost to finish them with ordinary laboar?—Ethelently worked, they should return 4 per ecut.
  - 49. Q. Where you have got to hold up water, is the demand in oxcess of the supply?—In a good year the water is in excess of the demand. In had years all the water is
  - 50. Q. In good years they ase the water for sugarcans P. sensonable.

- 51. Q. How many years out of ten would they take water for rabi crops?—Every year they take some, but ie bad years the acreage is larger. Last year was the largest on record. It was a bad year of rainfall, and we used up all the syster except in the Ekruk. We used up all the water in the Mhaswad tank also.
- 52. Q. Of the latter, 25 million cubic feet was seet to Pondhurpar?—Yes, there was cholsra there, and we were asked by Government to supply the town with water. We could have need it for irrigation.
- 53. Q. (Mr. Rajaratno Mudaliar.) 1s the Mhaswad a protective work?—Yes, we are obliged to hold up water.
- 54. Q. Generally a large quantity of the water is not ntilized?—We supply all domaeds, still a quantity remoins over.
- 55. Q. Do you know that the working expenses are Rs. 18,000 and the revenus 1s. 19,000, that is the average for ten years?—That is due to book charges; I don't think the actual cost of the maietenance is Rs. 5,000; the budget elletment varies from Rs. 5,000 to Rs. 6,000. We maintain ellotment varies from Rs. 5,000 to Rs. 6,000. no special establishmant there.
- 56. Q. What does the maintenance staff of the district at ?-1 cannot give the exact figures, ubout Rs. 2,000 n month.
- 57. Q. With regard to Koreganm and Ashti, the water is sofficient to irrigatu the whole area P.—The command area is always greater than the actual area irrigated.
- 53. Q. De you think there is great scope for the construction of tanks in Sholapar. At present thure are only four irrigation tanks ?—Yes, there is some scope for tanks, if small ones are undertaken.
- 59. Q. Is the system of application in force is your district?-Yes, ou all works.
- 60. Q. Considering the limited area irrigated by these works, is it not possible to dispense with applications:

  —In regard to some irrigation, it is possible, but a man might change als crop next year.
- 61. Q. Assuming that to be the case, the mere presentation of application does not dispense with measurements. You have to keep your records ?—I do not toink the system would work. In a famine year or a year of searcity you would have 10,000 acres under rabi and the next year only 300. There are variations in the irrigated areas every year. The rayat generally changes for the sake of rotation, year. The rayne g
- 62. Q. Bot your measurements would be your record? The measurements are made after the crop comes to maturity.
- 63. Q. Is there any hardship catalled upon the people in the motter of water applications?—In years of scarolty, we give the water in auticipation of sanction. We generally give water as soon as the application comes in, but not when there is a rush on the water.
- 64. Q. (Mr. Ribetson.) You say in paragraph 24 of year note that the scale of charges is fixed for three years?—Yes, they are changed every three or five years. They are now fixed for five years. They may be altered at the discretion of the district officers.
- 65. Q. These frequent changes retard irrigation naturally to some extent!—I would make the period ten years; but I nm not very strongly of opinion that it will increase irrigation, which is not retarded on this account.
- 66. Q. (Mr. Muir Mackenzie.) Did I anderstand you correctly to say that, in ordinary years, your tanks are managed on putely commercial principles, and that you do not hold up any water on account of the pessible demand for rabi crops?—Yes.
- 67. Q. Are you aware that there is a difference in these principles on the Nira Canal? -I have heard so.
- 68. Q. When the Collector asked for the supply of water to Pandharpur, did you object?—No, it was given on sautory ground, with the express sacction of Government.
- · 60. Q. Have you made any observations with regard to wells, and can you tell us what the average cost of a kachoha, well is ?—I have not made any observations, but I know that the average cost of a kachoha well, with five feet huilt up that the average cost of a kachoha well, with five feet huilt up for one mot, is about Its. 300, and that it will irrigate

#### TWENTY-SIXTH DAY.

### Sholapur, 4th January 1902.

#### WITNESS No. 63 .- MR. A. F. MACONOCHIE, I.C.S., Collector of Sholapur.

#### Answers to printed questions.

- 1. The onswers below refer to the Shelapur District and the Akalkoi Stote nttached to lt. I have been Collector and Political Agent hero since Fobruary 1890.
- 2. The average rainfall in each month for the last len years has been as follows:-

				Inches.	Cents.
•	•		•	0	•9
	•		•	0	42
٠.				0	47.4
		•	• 1	0	41.6
		•		1	9
				8	77
				3	28
			•	3	45.4
				8	54.6
				8	46.8
	• `			0	88'5
		_	_	n	3
	•				0 0 0 0

Three, not of these ten, have been years of famine. We have not had good rain except in 1898 since 1805. In consequence there has been a most serious shrinkage of the consequence there has been a most serious shrinkage of the sub-soil water. Every hot weather there is a scaroity of drinking water, to say nothing of that required for garden crops. The formation of the country being trap rock is unforcentable for wells. It is therefore of the unnext hupertunce to impound by every possible means the seanty minfall we do receive, and not let it run to waste, as nt present, down milit and rivers.

- 3. The area of the Sheldpur District is 2,006,378 acres, of which the cultivalence is 2,478,979 acres. The proportion of the latter, which is protected by Government Irrigation Works, is 3 per cent, while that protected by wells is 32 per cent. In 1896-97, 99,388 nerse were irrigated by wells. In 1000-01, on account of the scanty rain year after year, and wells, in consequence, running dry, and 38 549 nerse were so living and only 78,849 nores were so lirigated.
- 4. There are no private or villago irrigation works. The soil is red-brown (disintegrated muram) on the up-lands, poor in quality, but good enough to grow the indinary food-grains. On the ploins It is brown, of fair quality; lathelow-lying lands and valloys it io black, of excellent quality. Both brown and black soil are irrigated. In a normal year the cultivation of food-grains, the slaple of the district, is independent of irrigation, practically. But of leto normal years have been rare. Ordinarily irrigation is resorted to for crops offer than the slaple food-grains, such as sugarcane, turmeric and plantains, which require water all the conditions, conious, tobecco, which require water from June to January.

  5. The obstacles to the extension of irrigation are the 4. There are no private or village irrigation works. The
- 5. The obstacles to the extension of irrigation are the capricions rainfall, so often insufficient to replenish tanks and wells, the incofficient supply of mnunre, which the neople employ so largely for fuel on account of the scarcity of wood, and the rocky formation of the country, on account of which much of the cultivable aren is up-lands, insusceptible of command from reservoirs, while every-where wells are more costly and loss enecessful than in alluvial tracts.
- 6. Lonus under the Land Improvement Act are readily taken by the people, both for the digging of wells and the construction of dams round fields to arrest the surface flow of rain. We get more applientions than we can comply with. I think the inlorest might be reduced, or altogether remitted, in consideration of the fact that n well or dam touds to seem the payment of lend revenue in the future; when a well has been could and no water has been found, I would remit the whole olvance.
- 7. There is no movement of cultivators from anirrigated to irrigated tracts, because the land everywhere has nearly

nll been taken up already, and there is no room for new-comers. The people are everywhere desirous of the extension of irrigation, seeing the bearits derived by the few lucky villeges that are commanded by the existing works.

8. Irrigation increases the value of the produce of land by enabling the owner to raise two crops instead of one, and so make the land productive all the year round, also to raise more valoable orops, instead of the ordinary foodgraine, to which he has to confine himself if he depends solely on the rainfoll. I have seen no cril result from irrigation, nor heard of any, except that after about twenty years continuous irrigation the land gets "tired." The romedy is to let it remoin follow for a year or two, and then manner it carefully before irrigating it again.

9. The Executive Engineer has submitted the necessary details regarding the tanks and ennals in this district, which are in his cherge. I am not able to supply any further information.

10. The average depth of permanent wells is about 40 fect. Some are as shallow as 80 feet and some as deep as 80 feet. The supply of water is mostly derived from percolation, and is liable to full in a year of drought, either colation, and is liable to fail in a year of drought, either wholly or in great part. It does not become online, except by surface centamination. The cost of a thoroughly built well in which two " mots" can be worked, with a colid masoury top, is about Rs. 2,500; while that of a roughly built one is about Rs. 500. The former lasts 100 years, the latter 20. The water is raised by n" mot " ar lonthor bag diagged up with a rope over a pulley by two, four, or six oxen, according to the depth, yoked together, and walking down a slape from the top of the well. The average area communited by a well is about 2½ agress if the crop requires watering throughout the conson, and about 10 requires watering throughout the occasional about 10 acres if the crop only nants watering occasionally. In a year of scauty reinfull a well will increase the value of the produce by about 50 per cent, but in n your of drought by much loss, because the water is pretty sure to give out. In a year of ample rainfall it is not needed and is not used, for a jet of ample rational risk not noceed and to not used, for the rain is sufficient. I am speaking of the ordinary foodgrain crops. But of course a well embles a men to grow another crop during the hot season of a superior kind in every year except a year of drought. The owner charges his tenant double reut for irrigated lend. Government, however, does not raise the assessment on this account. The double reut is clarged as the total season commends by the double rent is charged on the total area commanded by the

11. In this rocky formation it is a toss-up whether water is found at a particular out, or not, and the sinking of a chaft often turns out to be labour wasted. The main of a climit often turns out to be labour wasted. The main difficulty of sinking one is the hardness of the rock. The people, however, understand blasting very well. Boring down with irou crow-bars for a distance of 20 feet or so at the bottom of blosted-out shafts where no water has been found is sometimes attended with success, and I have taken great laterest in trying to encourage the adoption of this practice throughout the district not only in such cares, but also in cases of walls which assults hold water and have roughly hold water and have roughly hold water and have roughly hold water and have roughly hold water and have roughly hold water and have roughly hold water and have roughly hold water and have roughly hold water and have roughly hold water and have roughly hold water and have roughly hold water and have roughly hold water and have roughly hold water and have roughly hold water and have roughly hold water and have roughly hold water and have roughly hold water and have roughly have rough niso in cases of wells which usually hold water and have run dry on necount of seanly rainfoll. What set me on this track was a well I saw at Aladha in December 1910, where the shaft found. The owner then got a long iron bar, slung it over a pulloy, set three men to hand it up and down, and one men to guido the blaws so delivered. In this manner he bored down gnido the blows so delivered. In this manner he bored down 22 feet, and who reworded by a flow of water hubbling up, sufficient to keep two "note" working all day during the season, and irrigating 6 acres of land. I immediately hought a lot of long but and distributed them among the Mainlatdars with instructions to lend them out to people who wished to try the experiment. I did the same thing in Akalkot, where the plan proved very successful. It was less so in the district, principally I consider from the want of zeal of the subordinate officials, who did not push the schome as they should have done. I had proviously bought a bering apparatus, but it gave no better results than the common iron bars; It had longer rads, but the reds had to be used as "jumpere" just like the bars, for of course in

Mr. A. F. Maconochic.

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Jan. 02.

Auotter letter, which I wrote to the Times of India ia Decomber 1900, about the well at Mádha, attracted the notice of Mr. F. J. Norman, an Engineer, resident in Japan, who wrote to me ahout the Japanese system of well hering which is called "Kaznsa," and which ha seems to consider very cultable to India, being cheap, rapid, and escried ont with very cimple apparatus. I have since been in communication with him, and I have reported the matter to Government for consideration whether it might not he advisable to get Mr. Norman to come over with a semal advisable to get Mr. Norman to come over with a small party of expert Japanese woll-einkers to try experimente in different parts of the country and teach their system to the natives. I append a copy of my report. The Rev. Eria Lewis, a missionary, stationed at Botul in the Central Provinces, also saw my letter in the Times of India, and he wrote to me from England that he had been much interested in the same subject, and had tried beging with Provinces, also saw my letter in the Times of India, and he wrote to me from England that he had been much interested in the same subject, and had tried horing with hare, as I had. His experience had shown him what we found here, that in the hardest trap rock one often strikes at various depths hands of soft decomposed rock which hold water, and that it is always therefore worth trial to go down a good deal deeper than the average native thinks of doing, who toe aften ahandons the attempt in despair when after going down 30 or 40 feet through hard rock he still finds no water. I think that an explosion of dynamite in a deep here-hele at the hottom of a shaft might often prove effective. If there is any water about, that eoght to fetch it ont. With the aid of the Executive Engineer I am geing to try soms experiments of this kind during the ensning season. Whatevor the means employed, I am in favour of well sinking being pushed on hy every possible means. I should like to see a special well-sinking brauch of the Public Works Department with parties in every district doing this aud nothing else. If we had had such an establishment since the beginning of our rule in these parts, there might have beeu by now a well in almost every field. And as wells are mado uselees by the subsidence of the sub-soil water that has taken place in this district owing to lung years of scanty rainfall, coincidently with well-sinking there should be a damming of the rivers and abids to impound all the rain water that now ruus to waste, ond so cause it to eink into the ground and replenish the epringe and hring the level of the sub-soil water up to ite former height or above it. Government should be money well spent in guarding against future famines. A special water rate could always he subsequently imposed to prevent excessive love. As far se possible, the owner of the fields should he employed in the work, for they would be money well spent in guarding against future famines. A special water rate could always he subsequently imposed t

12. No temporary wells are made in this rocky tract except in the heds of rivers and noise for the provision of drinking water during the hot whether. Government provide grants for this purpose in years of scanty rainfall.

13. I think that really scientific and decisive experiments in deep horing should be undertaken in the Decean, to find out whether there is any water-hearing stratum below the trap rock that could be utilized either by the mero according force of its contents on haing tapped, or by the employment of eterm-norms. ment of eteam-pomps.

14. Apropos of cleam-pumps, I think that there may be a great opening for their employment ou the hanks of rivers, and I would give special facilities and exemptions to enterprising land-owners who would set them up for irrigation of adjacent lands.

15. And I think that there is a large sphere of nsefulnot an American one with n straight plonging stroke, which I do not think is sound, but an English one with n sentral revolving spindle, and the result is highly satisfactory. It works with the mercat puff of a breeze, and in a tree like the December 200 and 100 eentral revolving spindle, and the result is highly satisfactory. It works with the merest puff of a breeze, and in a tract like the Decoan where cerery year the wind blows se steadily and strongly jest when irrigation is most needed, a machine like this is obviously of the greatest use. I have also put a Pulsomoter steam-pump in another well at Akalkot, to supplement the windmill pump on windless days. It does the work of two "mois" at slightly less coat, and I think that this expedient is also well worth the attention of capitalist agriculturists. It has excited u great deal of local interest and study at Akalkot, and many

leading men from the villages come in to look at both machines and consider whother both or either, perhaps on a reduced coale, could not he applied to their and their reduced ecole, contraining

reduced coels, could not he applied to their and their neighbeurs' holdings.

16. In the two last years of famine our efforte have, as far as possible, been concentrated on large irrigation tanks, of which we kept seven under construction. None of them, I am corry to say, have we been able to complete within the time during which the general distress lasted, a failors due to the magnitude of each tack. Every one of them ought to be carried to completion, famine or no famine, for they will, when finished, afford protection to their vicinity against the frequent failore of the raine in this tract of country. The Pathri tank, in particular, should be finished at once, for on its completion depende, not only the irrigation of a considerable expanse of country, but the water-amply of Effect towo, with its factories and railway that every year at present suffers from a water-famine overy hot weather, and has to fetch its copply from a noisa a mile and a half distant, in which the Monicipality, the Railway Company, and private gentlemen are reduced to dig holes to pravide themselves with one of the primary necessities of life. Before the necessity of water-works of every kind in this part of the connentry all other sorts of works are insignificant. Where a village was folly protected by already completed irrigation works, there I found not a single seal going, or ucediog to go, on to relief works. single seul going, or ucediog to go, on to relief works

No. D dated Sholapar, 23rd August 1901.

From-A. F. MACONCOMIE, Esq., Collector, Sholapur, To-H. F. BEALE, Esq., Superiotending Engineer on Special Doty.

Special Doty.

I have the honour to forward a statement showing the resolts of boring through rock for water in this district and the Akalkot state. You will see that while in many cases it was successful, in meny other cases it was not. I never thought it would be uniformly successful. All I cootend is that in this part of the ceontry there is no need for a myst to less heart se he does at present when after going dewn 30 or 40 feet through tock he fiede no water. There is always a fair chance that by going down 20 or 30 feet mere he may strike a fault in the rock or a stratum of red carth ("geru") or decomposed laterite which will yield water sufficient for one or two seasons' intigotice and availing to pull him through the bal times of drought.

Statement showing the names of the villages in which water-supply was improved by the boring of wells with iron-bars provided by Government.

Serial Nom- ber.	Name of village.	Origioal depth of the welt.	llepth of the hole bored	Whother water was imped or not.
	Sinogla.	Fecl.	Pect.	
1 2 3 4 5	Chepdi Rejuri Achkdani Sonalwadt Maeegaon	16 22 11 12 21	4 0 9 7	Water-supply improved.  Do. do.  Do. do.  1.0. do.  Water is tapped, bot is does not recover the
6 7 6 0	Shirbavi Sangola near Post Office Do. New Pelth Do. Mahom ed- an well.	21 10 30	12 12 12	mouth of the hole. No water found. Do. Do. Do. Do.
18 11	Do. Ator's well Do. well pear Laximi's temple.	} 35	{ 10 9	Do. Do.
	Snoriers			
12	Ulha		0	Below this depth the bar could not work.
13	Hagilar		5	Some water was foodd ofter blasting one foot of rock.
11	Chlocholi Kati , .		"	The work was abandon- ed.
15	Saogyl Budruk	15	11	Three feet of water enough for the work-
16	Saphale	25	0	Four feet of water coough for the work-
17	Chapalgaan	20	12	Three teet of water
18	Shtryval	36	0	Two feet of water
10	Do	30-	0	enoogh for one mot. Two and half feet of water enough for oos mot.
20	Akaikot Sháhálág.	35	18 4	

In Madha Taluka no experiments were made with the

In the Patils' well at Madlis, the water rose 6 feet and lasted for four months when he used hie own bars for the first time irrigating 6 acres. When the water began to diminish, the l'atil agniu bored the helss deeper and the water rose 8 feet. The present height to which the water rises is only one funt.

In Malsiras the experiments were not saccessful.

In Bársi ditto

In Karmala in one case the water was found and in two other cases it was not.

In Pandbarpur, in one case only the experiment was attended with eny saccess, and in others it was a failure.

No. D dated Sholapur, 18th October 1901.

From-A. F. MACONOCHIE, Esq., Collector, Shelnpur, To-The Hou'ble SIR A. WINGATE, K.C.LE., Commissioner, C. D.

Last December I was much interested by a successful experiment at Mádha of boring deep through solid rock for water. The owaer of the well blasted down 56 feet without finding water. Then he got a long iron bar and drilled down 22 feet more, with the result that he obtained a bubbling flow of water that was sufficient to irrigate six aeres throughout the whole seasen. I brought this to the notice of Government in one of my Famine Progress Hoparts, and also wrote a lotter to the Times of India about it. I also set similar borings in progress in every taluka of the district with the result that in about 50 per cent. of cases water was obtained in previously dry wells. I have already communicated these results to Mr. Beale, and he has the matter under consideration. I believe that my crample was followed in Ahmedaagar with good success. My letter to the Times of India attracted the notice of Mr. F. J. Norman, an Engineer in Japan. He wrote to no in May on the subject, and I have since been in com-

manication with him It appears that in Japan they have Mr. A. F. n prouliar system of boring called "Kazusa" which enables Maconomics one with simple appliances to drive bore-holes down to great depths in search of water, and that the results 4 Jan. 02. obtained are execlient. Mr. Norman has seat me a cample of the bambon piping used, and also samples of the strata not with at depths of 300 and 720 feet at his own residence Kaikikan. I annex them. Unfortunately the samples of soil got mixed up in the opening, but they are of much the same nature. The fragmente of shells indicate a marino deposit.

- 2. You will see from the enclosed papers that Mr. Norman is anxious to be employed by Government to teach the people of India the "Kazasa" system of boring. He undertakes to bring with him three first clase Japanese well-horars. He states the terms on which he would be will to do the and asks for an eight months' contract. willing to do this, and asks for an eight months' contract, saying that a telegraphic remittance of 2,500 yes would be followed by the cunbarkation of himself and his party within a wesk from its receipt.
- S. I think the experiment is well worth trying. I do not know whether the Japanese methods would be of much avail in the trap rock of the Decean, but I imagine that iu an alluvial tract like Gajarát they might very probably prove of the ntmest value. The ingenuity and efficiency of Japanese workmen with the shaplest appliances are actorions. There is much force in what Mr. Aormau saye in his last letter to me: "The Japanese are a wenderful people, and have many ways of deing things that are for an nucleosted and semi-barbarone people infinitely superior to the ways we accidentally would force upon them. an nuequented and semi-barbarene people infinitely superier to the ways we accidentally would force upon them, irrespective of the fact that they have not been educated up to our ways and methods. I do really think their half-way methods, such as the 'Kazusa' system, are more applicable than our own advanced and scientific methods, that is where people like the Indian rayats are concerned. We work above their levels. Japanese officialdom works down to their levels. There is a mean, but the difficulty is to find it."
- 4. Commending this subject to the favourable notice of Government.
- 1. Q. (The President.) How long bare you been bere ?- Nearly three years.
  - 2. Q. All through the famine?-Yes.
- 3. Q. You say in your note, "In this rocky formation it is a tuss-up whether water is found at a particular spat or not, and the sinking of a shaft often turns out to be about wasled." You mean on account of the hardness of lock and the uncertainty of finding water ?—Yes.
  - 4. Q. You don't find salt in the wells !- No.
- 5. Q. You attach great importance to the extension of well irrigation?—Yes, combined with measures for raising and maintaining the level of the cub-soil water, such as damming natus and also patting anicuts across the rivote and running off the water into storage tanks at the side.
- 6. Q. Your view being that the first object in damming the rivers is to check the too rapid flow of the surface water and allow of its sinking into the sub-soil?—Yes.
- 7. Q. That is quite apart from direct irrigation !- Yes. for the sake of the wells.
- 8. Q. You say in paragraph 10, "The cost of a thoroughly built well in which two mote can be worked with a solld masonry top is about Rs. 2,600." That is a high price ?—That is an outside price for a very good wall.
  - 9. Q. Are many such built !- Not very many.
- 10. Q. I suppose they are built by takavi advances?—Yes, a great many, and a great number from the people's own resources—I find in the last 10 years that 1,910 wells were built with the help of takavi and 2,876 at the rayats' own cost.
- 11. Q. (Mr. Ibbelson.) Does that include kachcha wells?—Yes, a kachcha well means sank through rocks, without a mortar and stons wall at the top. In the kachcha well the wall is made of dry masonry, and is a very solid thing indeed.
- 12. Q. (The President.) The kacheha well has a leng 'ife ?—Yes, it has a lenger life than in Gujarat.
- 13. Q. Are there any kacheha wells without any masonry at all?—I think not.
- 14. Q. The really expensive part of the well is done when the trap has been pisceed?—Yes.

- 15. Q. Up to what amount do you give fakavi advances if a man was going to build a well costing say Rs. 2,000. What would be get from Government?—It depends upon how much land he has got and what accurity he has to offer. In one case we advanced Rs. 10,000 in the case of an enermous well 160 feet long and 30 feet deep.
- 10. Q. How much did the man spend?—I think he spent Rs 30,000; he lassix to eight metes going night and day, and hopes to be repaid.
- 17. Q. How much inigation is there under the well?—I den't know the exact area; it is comething very coasiderable.
- 18. Q. That is quite exceptional; supposing a man is going to build a well costing lis. 2,5: 0, what would be the amount to be reasonably expected from Government P-If we had as ample allotment, I would give him the whole
- 19. Q. Wenld that be pretty often done?—My experience has been that one-half or two-thirds is generally given. I think it would depend on the allotment at our disposal; if there were many applications, we should not give more than balf.
- 20. Q. Do you spend your allotment every your ?-Yes, of late it has been increased; last year we disbursed 3 lokhs, the year before 31 lakhs.
- 21. Q. (Mr. Ibbetsen.) Was that largely for seed and bullocks?—Yes, but mere than half for wells.
- 22. Q. (The President.) Have you ever applied for an increased alletment?—Yes, and my demands have been nlways met.
- 28. Q. You have not been restrained by want of money from granting takavi?—No.
- 24. Q. You say in paragraph 6, "We got more applica-tions than we can comply with. I think the interest might be reduced or allegather remitted." Do you think if the interest was reduced, it would make much difference?—I think pethaps it would be a greater inducement if the period of repayment were extended and the instalment reduced.
- 25. Q. What is generally the period of repayment?-Up to 10 years.

- Mr. A. F. 26. Q. I understand the legal time is up to 20 years;

  Maconochie. why is it generally shortened? is it nervousness on the part of the Mamlatdar that something may go wrong and that 4 Jan. 02. he may not get the money back as soon as possible.
  - 27. Q. You think the time might be extended of least to 20 years?—Yes.
  - 28. Q. How much do you think it might be extended to P—I mean extended up to the full 20 years. I don't think it would be wise to extend it mere than 20 years—unless the cosn himself proposed to return it sooner, I think the full concession might be granted.
  - 29 Q. The law is, I understand, that if a man at his awar cost constructs a well, he sholl not be charged extra accessment f—Ho is not charged onything extra doring the currency of the existing term of settlement.
  - 30. Q. Ho is not charged in all future actioments I am given to understand ?—I confess I thought that he would not be charged extra during the continuance of the existing actilement, but that some enboocement would be put on at the next.
  - 31. Q. That seems the general impression, although apparently the law is more liberal. It has been suggested npareous the law is more ineral. It has been suggested that, instead of asking a man to report the fakari advance at all, he might be made to pay un addition to his accessment—a wet rate insleed of dry; do you think that would be a popular method of proceeding?—Yes, I think it would be popular—it would be a very good thing to try.
  - 32. Q. In paragraph II you give an interesting account of what has been done to deepen wells; it has been attended with a good deal of soccess?—Yes, there were also many failures, but still we got success in so many cases that it seems worth trying.
  - 38 Q. Do you know what is the cost of boring per foot through trap rock ?—Very little indeed—it would be the wages of three men at three annas per day.
  - 34. Q How far would they get in the course of the day P-About a foot.
    - 35. Q. That would be nine annas a foot f-Yes.
  - 36. Q. You have had correspondence with Mr. Norman in Japan and reported the toatter to Gorornment suggesting that it might be advisable to get Mr. Namun to come over. What was the reply !— I have not get a reply.
  - 37. Q. Did you write lately "-Yes, the letter was sent to the Superintending Engineer for report by the Commis-sioner. I don't think it has reached Government.
  - 38. Q. You say that with the aid of the Executive Engineer you are going to try some experiments with dynamito in scarching for water. Hove you had time to make any experiments?—Only one.
  - 39. Q. Do the villagers readily pot hold of dynamite?-No. we had great difficulty in gottlag it op; we got it from the Agents of Messrs. Nobel & Co. in Bombay, but it was no the wrong time of the year; the railway company would not carry it then except on special terms, and we had to toke a whole waggen for a small quantity of ICO pounds; it is dengerous stuff; if the raynts handled it, they woold, I'm sure, blow themselves to pieces; they only understand blasting with natiro pawder.
    - 40. Q. They got that easily ?-Yes.
  - 41. Q. Yoo think there might he n special bronch of the Publio Works Department guing about to cover the country with wells ?—Yes, I should like to see some decisive boring, through this trop rock, going down 100% feet if necessary, to see if we can get iota another formation that hears water, nobody here can offord to conduct such experiments.
  - 42. Q. I suppose the Geological Department connet enlighten us on the point?—I don't think so.
  - 43. Q. In paragraph 14 you suggest the employment of steam pumps; ore there my in this district?—There is only one in Akalkot, it is a pulsometer, we use that on windless doys, when the wind-mill pomp will not work. I know of another man who had a steam-pump in the Boroda Stote, where it was very successful.
  - 44 Q. Hove you heard of any tendency among the agriculturists to start anything of that sort?—There are a few who are thinking of 11, but I don't think he idea has struck them generally ret-
  - 45. Q. It would be a great saving in cattle?—Yes, a great saving, but a difficulty would be fuel.
  - 46. Q. You ollude in paragraph 16 to windmill pumps; you say there is one at Akalkot; have you got any statisticas to what amount of water it roises or what is the oworut

- of irrigation done by it?—It is not for irrigation, but for the supply of water to the town. One big well of 40 to 50 feet ran dry, end this pamp put in water at the rute of a foot an hour; the cost of the wiedmill is it9,000.
- 47. Q. Yon have not seen it tried for irrigation?—No. Ooe day with a strong breeze it pumped water 104 feet high.
- 43. Q. How deep is the well, approximately?—Thirty or 35 feet deep, I think, with 4½ feet of water in it.
- 49. Q. You say in the last paragraph, "In the two last years of famine our efforts have, as far as possible, been concentrated on large irrigation tonks, of which we kept seven under construction. None of them, I am sorry to say, have been oble to complete." You think they should be carried on ?—Yes.
- 50. Q. Do you menn without waiting for the next famine?—Yes, as ordinary poblic works; the Pathri tonk should be the first, because it is most nearly nished.
- 51. Q. You ottach importance to it because of its belp-g the town of Lorsif-Partly and also on necount of
- 52. Q. Mr. Beale says it would submerge 818 ocres and irrigate 1,231, so that it would not be very useful?—We have taken up all the land that is to be submerged and paid componention, so that I think the work should be slorled.
- 63 Q. Have yoo always done that P-Wo have not taken up the whole of the over in all cases, but in the case of Pathri and Vadshivne we have taken up all the land that is to be submerged, for the rest we have only taken the land required for the work.
- 51. Q. As regards sites of possible reservairs, I suppose those you know are among those noted on by Mr. Reale?—Yes, the most important ones are those in the south-west, because that is the most distressed area.
- 55. Q. (Mr. Higham.) You say of the end of your memorandum "Where a village was fully protected by olready completed irrigation works, there I found not a single soul going or needing to go on to relief works." What do you regard no being fully protected P—A canal running right through the middle of the village.
- 56. Q. What proportion of the cultivated area of the villing should be fully protected in order to keep people off relief works? —I think 50 per cent.
- 57. Q. You think you must have 50 per cent.; less than that would not do ! I am not sure.
  - 58. Q. Have you not thought of it?-No.
- 59 Q. Take the villages that are protected by the Ekruk tank, for instance; do ony of the villages from there go on to relief works?—Very few, I am suce. I cannot tell for certain. I was thinking particularly of Woki village on the Mhasvad canal to which I went and enquired how many of the inhabitants had gone to relief works, and was told not as held reason. one had gone.
- 60. Q. The Mhasead tank irrigates on on average 6,500 nores and in the famine your, IS99-100', it irrigated IS90-0 nores, so that it did very well that yeu; taking the whole of these vidages in this tract, would it be possible to ascertain roughly what proportion of the population had gone to relief works?—I think we could find it out.
  - 01. Q. We should require-
    - (1) Cultivaled area.
    - (2) Aren irrigated.
    - (3) Population.
    - (4) Numbers on relief, including gratuitous and allfarms of relief.
    - (5) Area matered.
- 62. Q. There is no record in the village of how many people and gone to relief works?-No.
- C3. Q. I suppose the village patel could give a fair iden?.
- 64. Q. Here in Bombay did the people go le the nearest work or did you druft them to a distant work ?—We didn't keep them off the nearest work in 1809.
- 65. Q. Were you in charge of the district in 1896-97 ; 5 No, I was at home.
- 66. Q. I rumember when we came round here in 1899, we found that the labourers from many villeges in Sholapur were sent to the Shetphal tank 9—Yes, tifat was enforcing the distance test; this time we had be distance test.

- 67. Q. Have the mustor rolls been destroyed by now ?— I om nat quits sure about that.
- 68. Q. In that cose you must rely on the Patel; still there must be some sort of information available for the Eknuk tank?—Yes, I think so. I shall get it aut.
- 69. Q. I understand you to suy that samething should be dano by constructing noirs across the heds af the different rivers hote for holding ap water?—Yes, I should hope to see that done.
- 70. Q. Have you any idea of the places where that could he done?—It is merely a general impression of mine.
- 71. Q. Would you propose that Government should build a weir and let the people take all the benefit they could out of it?—I think it might be possible to run water into storage tanks.
- 72. Q. I'm afraid lie country does not lend itself to that; da you think it would be worth while to collect the water for purposes of lift?—Yos.
- 73. Q. In that case I suppose the people would not be able to pay enything for it, or would you put a water rate and—Yes, I would gut on a water rate.
- 74 Q. You could not increase the a-sessment for lands that are irrigated by a work of that kind?—I don't see why the assessment should not be increased if the land is improved.
- 75. Q. It could not be increased till the next settlement?—Yes, it could, by putting ou a water rate.
- 76. Q. The whole area would have to be measured up; the difference between imposing a water rate and increasing the assessment is that in the latter ease people are left more to themselves in the central and distribution of water ?—I don't see why the area irrigated could not be measured up; the village staff could do that.
- 77. Q. You say in puragraph 10, "The cost of u thoroughly built well in which two mots can be worked, with a solid mason; top, is about Rs. 2,500, while that of a roughly built one is about Rs. 500. The former lasts 100 years, the latter 20." Under these circumstances, would it not suffice to build the observer one? All that would fall down in 20 years would be the dry mason; at the top?—There is always an upper stratum of earth and morrow that would fall in; Rs. 2,500 is an anteide limit for a masonry well.
- 78. Q. Are not kachcha wells good onnigh?-Yes, for all proceical purposes.
- 7D. Q. You say the average area commanded is 2½ acres; do you mean only 2½ acres of crops are raised on each well in the year, or may not two or three erops be raised on the same land !—Yes, several crops.
- 80. Q. Da you mean the area actually commended or the area that is eropped every year?—The area to which water can be supplied.
  - 81. Q. That might mean more than one erop?-Yes.
- 82. Q. I think they have governly more than one erop an the well?—Yes.
- 88. Q. Is the aren that you have given for a woll of two mote or the aren for each mot ?--Far one mat.
- \*4. Q. Your blg well costing Rs. 2,500 would contain two mots β—Four mats.
- 85. Q. You say you think it would be n good thing if Govornment would make wells and charge a wet assessment on them ?—Yes.
- 86. Q. In that case do you think wells should be made by Government officers of the Public Warks Department or others, or wauld you give the money to the people and tell them to make them themsolves?—The people could do it cheaper and would profer it.
- 87. Q. You would give takevi advances and moke n perpetual charge !- Yes, instead of requiring than to repay the loan.
- 88. Q. It would proclically be equivalent to that; you would advance the money and require them to pay so much a year for extra land revenue. Do you think that would be worth trying?—Yes, I think so.
- 89. Q. Would there be any objections to it ?-I don't see any.
- 90. Q. If n well failed, Government would have to robuild it?—There would have to be some understanding about require. I think the man would be sure to keep it in repair himself.
- 01. Q. You spoke of the Pathri tank as one that should he completed at occe, because the Barsi town and Municipality are interested in it?—Yes, and the railway.

- t2. Q. Did they make any contributions towards the co-t, Mr. A. F. or do they pay for the water?—They don't pay for the Maconochie water; they have not contributed anything towards the cast of the work; the Municipality have ogreed to take up a loon for bringing the water into the town; they could not expect to got the water for nothing.
- 93. Q. I suppose you could not charge them very much ?—Na, they are rather a poor Municipality.
- 94. Q. Have factories spplied for water f—I think they would agree to take it, the railway has promised to pay for the water supplied.
- 95. Q. The tunk could not supply much for irrigation if it has to supply all this?—That would seriously diminish the water for irrigation.
- 96. Q. You would always have to keep up a certain minimum supply for the town?—Yes, it would be like the Ekruk Tank.
- 97. Q. Nothing has been settled about what they would pay for it ?--No, no one knows if the tank is to be completed.
- OS. Q. World 'n incidence completion in arrangements could be made as to what they should pur?—If Government saw their way tawards gotting some return, they would earry the work to completion.
- 09. Q. In regard to taking up land for the small tanks that are proposed, is it necessary, do you think, to take up all the load that would be submerged; do you think the people themselves wish it taken up or would they prefer to be allowed to cultivate it?—They would prefer to retain it.
- 100. Q. If the people themselves are not very anxious, ought it to be considered whether we might not allow them to retain the awarrship ?—One never knows haw much land will be submerged.
- 101. Q. I think all the land that is submorged could be cultivated; if the people who own it were allowed to retain it, it would probably make the works more papular and it would reduce the cost of water. I understand in this tract you have actually parchased the land P—Not all.
- 102. Q. Have you knows cases in which the owners of land have objected to its being taken up; I suppose you natify it nader the Aot?—We have been settling it by private armagement; in ano case it is doubtful if the land will be submerged every year and we have allowed the owner to rote in it; it esays ho won't claim any dumages if the land is submerged; we paid no compensation to him. But the deeper land always is submerged. I don't think our tanks over run quite dry.
- 103. Q. There must be a large area round the edge that is dry in dry years and might be caltivated f-Yos.
- 104. Q. Where did this windmill come from ?—From England; it was ordered out by the State and cost ultogether Rs 9,000.
- 105. Q. Have you any idea of the quentity of water it rnises P-No; I have never had it measured.
- 106. Q. Haw high dees it lift water?—About 25 to 30 feet; it is then run through pipes into another well, whence it is lifted into the reservoir; it is for the water-supply of the town.
- 107. Q. Wherever yan have a wind-mill for water-works, you would require an oil engine or bullacks to work when the wind fails ?—It would be a nseful supplement, but the breeze is protty steady during March, April, and May.
  - 108. Q. It can be relied upon then ?-Yes.
- 100. Q. If lifting manhinery is put an to these Government streams, would Government want to charge any rayalty for the use of the water ?—Yes, I suppose they would.
- 110. Q. Are there Government arders to that offect ?— Yes, we charge for water raised from nalas naw (a patasthal charge).
- 111. Q Is that rate charged in this district ?—Yes, but rarely.
- 112. Q. How is the water raised,—by bullooks ?—Sometimes by ballooks, sometimes by hand lifts.
- 113. Q. What is the amount of the charge ?- Rs. 3 per nere.
- 114. Q. What is the total amount ?-Samething very small, only a few handreds of rupeos.
- 115. Q. (Mfr. Ibbatson.) You say that when a man builds what has been called a kachcha well, he builds up dry mascury from the surface of the rock to that top; how long would u well of that sort last on the average?—About 20 to 25 years.

Mr. A. F. 116. Maconochie. Rs. 500. 116. Q. What would be the cost of a two-met well?-

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- 117. Q. As much as that ?—I think so; it depends on the size of the well; it would probably he within Rs 500.
  - 118. Q. Something like Rs. 500 P-Yes.
- 119. Q Then esting uside your Rs. 2,500 well, which is a luxnry, supposing thet instead of spending Rs. 500 on a well to last 25 years, a man wauted to make oos to last from 50 to 75 years, that is to eay, to build it with mortar and musonry, whet would the cost of that be?—It would cost from Rs 750 to Rs. 1,030.
- 120. Q. Ho woold get double the life of his well ut less than double the cost ?— Yes.
- 121. Q. The President made a suggestion that the most expensive pert of a well was finished when the blasting hed been done; you seemed to assent, but I am not quite sure if you did, have you considered the point ?- No.
- you did, have you considered the point?—No.

  122. Q. You say if you had many applications for tokevi, yoe would probably give u man only half the amount he saked for so as to spread the benefit over as lerge a nomber no possible; does that not meen often that he cannot make a well at all, or that he makes a vory foreion well which is in the end more costly; would it not be hetter to give the full amount a-ked for to half the number of people who had mede applicatione and let them meke thoroughly good wells. I am referring to ordinary yoers, not famine years?—I thick they are apt to ask for more then they reelly want.
- 123. Q. I don't mean to give as much as they ask for, but only enough to make a good sened well to last any 50 years ?—Yee, I thick it is.
- 124. Q. You say that the amount advanced to a men depouds on the value of the security be offers, that is the unimproved value of the lend?—Yes.
- 125 Q Your loss in to ke vi by irrecoverable advances is very small?—Yes, spart from the famine.
- 126. Q. Is that wholly due to the caution that is exercised by your Mamlatdar, or in part or mainly to the feeling amongst many people that the taken is a debt of hooour; does that feeling exist here?—I am afmid it doce not exist.
- 127. Q. You don't think it would be safe in making ad-127. Q. You don't touch it would be sare in mixing acconces to go beyond the value of the land as it chands, in consideration of the fact that, when a well is made, the value of the land will be doubled. Do you think you might be holder than you are nt present in the matter of advences?—I think in view of the oncertainty of striking a good snipply of water or perhaps gotting any water ut all, it would not be very prudeot.
- 128. Q. Supposing Government safeguarded itself, first by a trial boring so an to satisfy itself about the water; and secondly, in order to make our thet money was being spent on the well, by advancing the money in instalments; with these two precautions do you think it would be safe to lead beyond the value of the laud F—I think it would ho rather risky.
- 129. Q. The reason I ask is that we have heen told by several people that a serious obstacle to the extension of well inigation is the difficulty of getting enough money to make a well; Government is ready to advance something, but half the amount is uo hetter than nothing if the rest of the money cannot be got; therefore I am unxious to know what you think about more liberal advances P-(No
- 130. Q. You say you would not extend the period of repayment of advances over twenty yeers; but you are pre-pared to substitute wet assessment as a permunency; what is the advantage of the wet assessment over the instalment principle?—I think perhaps it would be more
- 131. Q. Why should it be more popular; why not extend your taker; period if necessary beyond 20 years?—Would it not menn more Government money outstanding; can Government afford to get it back so elowly?
- 132. Q It would mean even more than that; if you only take wet a seessment, it would practically be a permanent leau ?-Yes, earning good interest.
- 133. Q. I don't quite ere the objection to extending the period of twenty years if you are prepared to adopt the other cystem? (No suswer.)
- 134. Q. Supposing you imposed a wet assessment, I presume the best well must feil in course of time, and you could not go oo recovering the wet sessessment after the

- well had ceased to be workable, could you?-I soppose you woold have to mend it.
- 135. Q. Is that always possible; is it not sometimes cheaper to huild a new well, when a well gets to a certain age?—In the case of a well sunk through rock it would be cheaper to clean out the old shaft.
- 136. Q. You don't think there would be any limit practically to the age if the well is repaired F-No.
- 137. Q. Did you make eny nee of the notification in regard to increase of powers to subordinates for granting advances?—We only gave increased powers to Memlatdans, nod we employed certain head Karkuns.
  - 138. Q. How did that work, was it satisfactory ?-Yes.
- 139. Q. Would you be prepared to alter your roles and give increased powers to lower reveues officers than now have the power? No.
- 140. Q. At present only the Assistant and Doputy Collector have the power?—Yes, and the Mamlatder for small amounts.
- 141. Q. Would you advice giving the Mamlatdar iccreased power !-Yes, I thick so.
- 142. Q. Would you limit the amount to Rs. 100 ?-I thick they might be given power to Rs. 300.
- 143. Q. You say in your note that there have been four femines in Sholapur in the past 25 yeers. Whon did they occur?—In 1876-77, 1896-97, 1899-1900, and in the past
- 141. Q. Is the whole district subject to famine?the two eastern talukas, Barsi and Sholapur, less thau
- 145. Q. Were many kachcha wells made during the famine?—I think the majority were kachche, but I beve not got separate figures.
- 146. Q. By kackeka I understand you to mean dry massury?—Yes.
- 147. Q. It has been suggested that people should be assisted by grants-in-aid to make them pakka. Do you think that would be n good thing?—Yes, I think it would be—it would prolong the life of a well.
- 148. Q. How would you set about it?—By giving them additional takavi for morter and labour.
- 149. Q. Would they take it to make their wells pakka? We might give it ou very easy terms, perhaps charge no interest ?-I think they would be gled to take it.
- 150. Q. You thluk thet would be a good thlug to do?
- 151. Q. You eay that in a normal year the cultivetion of food-grains is independent of irrigetion. Does that include rabi crops?—Yes.
- 152. Q. You have no winter snius bere like they have in Northern India ?—No.
- 163. Q. Would you ordinarily in a fair year get fair rabi crops without any irrigation at ull ?—Yes.
- 154. Q. What interest does a bonia charge if a fairly well-off tenant horrows money to build a well. I meen an ordinary solvent tenant, not au extraordinarily well-off man P—Not less than 12 per cent.
- 155. Q. Wells are used ordinarily for garden crops, the highest form of cultivation, and sugarcane, are they not ?-
- 156. Q. With regard to these wells that you would like to make all over the district, do you contemplate their being used for that form of cultivation?—Yes.
- 157. Q. Do you think the supply of manure would be sufficient for them F- Yes, I think so, because the number of cattle would increase.
- 168. Q. I suppose it is only a man who is fairly well off who could go in for that kind of oultivation; it is expensive;/
  there is a good deal of lebour and manure required; do you think people would use their wells to the best advantage?—

  I think the people might be trusted to do that.
- 159. Q. You propose that Government should make them or pey for their being made P—Yes.
- 160. Q. How do you propose that Government should recoup itself P—By increesed assessment.
- 161. Q. With reference to this case that you quote in paragraph 11 of a well io Andba where a shaft was sonk 56 feet without water and eventually water was found by boriog 22 feet desper, did the water rise in the well?—Yes

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162. Q. To what dopth?—There was 6 feet of water every morning in the woll, the owner drew that off hy svening and again next morning there wee 6 feet of water in the well.

163. Q. Did ho lift the water 78 feet (56+22) ?—No, he had to lift it 50 feet.

- 164. Q. You eaid just now there is very often no water to be got, we have been told that, supposing a well was made regardlese of cost in all ports of the Deccon, where they could be made, even then we could not irrigate more than one-tenth of the cultivated area; what do you think as regards your district, supposing you had a well wherever it could be worked profitably; is that a low or a high estimate?—It sounds to me a low estimate.
- 165. Q. Would you double it, at any rate it would be a small proportion, it would never be noything like one-half?—No, nothing like one-half.
- 166. Q. You say in paragraph 14 "a propos of steam-pumps I would give special facilities and exemptions to enterprising land owners who would set them up for irrigation of adjacent lands." What sort of encouragement has suggested itself to you?—I think I would exempt them from any charge for water for the first ton years.
- 107. Q. The Bombay Government has given them leave to irrigate a certain area free of charge; is it best to limit the area or limit the term and let them irrigate as much as possible ?-I think to limit the term.
- 16S. Q. You say in paragraph 16 I have also put a Pulsemetsr steam pump in another well at Akalkot to sapplement the wind-mill pamp on windless doys. It does the work of two mots at slightly lese cost. Do you include the deterioration of machinery and interest on capital cost in working that out?—No, I have not worked it out, that is only what the Administrator told me. I coold get it worked out if you like.
- 169. Q. Yes, please, I should like to know. In any case the fact has to be coosidered that the mea and bollocks for whose laboar the Administrator will charge in calculating the cost of well irrigation must be there to a large extent and lie idle if the pump does the work for them P--Yes, that is no. I suppose they could be complayed clambure. that is so. I suppose they could be employed elsewhere.
- 170. Q. Speaking of protected villages where no one went on relief, were there any well-irrigated villages ?- No, I was thinking of Waki.
- 171. Q. What is the history of wells in the samine ?-A great mony gave out.
- 172. Q. Wheo ?-In 1899-1900. We have not had good rainfall since 1898, either wells rau dry or the supply of water falled.
- 173. Q. Next year?—In 1900.01 they were worse still, the irrigated area saok from 99,000 to 78,000 in four years notwithstanding the kachcha wells made.
- 174. Q. Do you know whether before the fumine wells were lying disused !- I don't think many were disused.
- 175. Q. You were not hero?-No.

176. Q. (Mr. Rajaratna Mdlr.)—In paragraph 3 of your Mr. A. F. memo. you give the cultivable area. What is the occupied Maconochic. area?—It is nearly all occupied, there is very little waste, I have not got the figures.

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177. Q. (The Precident.)—Have you any reason to believe that the population has gone down since 1896 in this district?—No, it has not increesed as rapidly as it otherwise would have done; the ceasus gives a decrease of 30,000, that is due to emigration, 50,000 to 60,000 people went to Berar, but many people have returned, in fact there has been a small increase I am sure.

178. Q. (Mr. Rajaratns Mdlr.)—Mr. Lawreuce shows a large area mider "other sources."—What is that ?—It is not a large area, only 2,000 acres from nalus.

179. Q. It has decreased from 6,000 to 2,000, what is the reases of the decrease?—Nalas ranning dry; there has been a scanty rainfall for so many years running.

190. Q. In the past ten years large sums have been advanced for wells; de you know the number of wells constructed or repoired P-1,910 were constructed and 2,778

181. Q. What steps are taken to see that the 7 to 8 lakhs that have been advanced for wells have been properly utilized, are the wells inspected ?—Yos, the Mamlatder inspects them.

182. Q. Are they required to sead in a report?—There is no regular system of inspection.

183. Q. I suppose you graat advancee in the lamp and not by fixed instalment ?—Yes.

184. Q. So that there is practically no check as to how moch has been reelly spent on the welle ?—Euquiries are made and if a case is found aut of money not heing properly spent the whole advance is recovered in a lump.

185. Q. There is no systematic inspection !- No, no returns are sent in.

186. Q. On the Ekruk tank we found that the highest aren irrigated was onder 5,000 aeres in 1899-1900 and the average aren about 3,200. Is there any possibility of extending irrigation ?—I thick the Poblic Works Department. had better be consolted on that point, the question of Ekruk is complicated by the water-sopply of the town, tho railway and the mills. I don't think there is much chance of increasing the irrigation from that tack

187. Q. Are there any wells to supplement the irrigation from the tack ?—I believe there are the usual number.

188. Q. Within the area commanded by the tauk ?—Yes, I believe like any other village they have the usual number of wolls.

189. Q. Is the eystem of application for water in force under this tank !- I think so, I have not studied the sabject:

100. Q. I ask the question because the Executive Eggineer is not coming for exomination?—I think he has referred to it in his writton reply.

WITNESS No. 64 .- ME. H. L. PAINTER, I.C.S., Assistant Collector, Sholapur.

Answers to printed questions.

I must prefine my remarks by saying that my experience of the Decean is confined to the last nine months, during only about three of which I was travelling in the district. All my previous experience is of Gujarat. Consequently the information which I have personally negotive is small as regards the Decean.

I now take the points in the memorandom on which I am capable of giving any information.

Point 2.—The gross area of the Sholnpur District is 2,909,378 heres, out of which 2,478,979 is returned as culturable. The praportion of the latter protected by Government irrigation works is '33 per cent. and hy wells 3.2 per cent. "Private or village warks" do not exist, as far as I know, in any shape other than wells or embankments; the former have been taken into account and no statistics are areallable for the latter. The soil region greatly, two bread arollable for the latter. The soil varies greatly: two broad divisions are the henry black soil of the valleys and the tight gray soil of the uplands. Relafoll averages 25 inches: the lote rains are chiefly depended upon, rabi crops being the backbone of cultivation. Water is only used doring the measure for garden crops: for ordinary crops it is ased, if

available, when a prolonged break in the rains occurs. All orops are capable of irrigation, bot with a good moneoun only such crops as are known as garden orops require it. Engarcane and makka (moize) are the chief bagayat crops of the district as far as I have noticed. The number of waterings depends on the soil, method of cultivation and waterings depends on the soil, method of cultivatioe and kind and quantity of manner used: I connot give any precise figure. Distribution of water from emals is controlled by the Irrigation officers and their subordinates, who by personal inspection see that no one gets water from the sauni unauthorizedly and that no waste occurs. A man pays so much per acro for any particular crop (there is a regular scale, in which sogaroese comes highest) and can take as much water for that crop as he whats. Irrigotion revenue is realized in cash at the time of the land revenue instalments. instalments.

Point 3.—There is practicelly no cotton grown in the district, and the black soil of the valleys above alloded to differs from the black cotton soil of Broach and Surat in its properties, though it somewhat resembles it in appearance. The black soil of Sholapur cao he, and is as a matter of

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course, irrigated with success, whereas irrigation of cotton soil in Gujarát is, os far as my experience goes, a failure. Point 4.—The completed tanks in my onbelvision (Sholapur, Bársi, Mádha oud Karmála Tálnkus) are the Ekrak and Ashti tanks. I cannot give toolmical figures. These works cannot be entirely depended on in a season of drought, but if the early rains are heavy they are expedience of rabic crops owing to an early coesation of the monsoon. Yorks atill nucompleted are the Pathri, Hotgi, Vedshivne and Manji tanks. Manji tanks.

Manji tanks.

Point 5.—The Public Works Department is concerned with this: I know nothing about it.

Point 6.—Distrist and village works are, as fares I know, naknown here. The only way I can think of in which each works might be assful would be if they took the form of impounding water in nales during the monocon so as to raise the level of the sub-soil water in the neighbourhood, thereby improving the supply of water in wells for drinking and irrigational purposes.

Point 7.—The total areas irrigated from wells (for the whole district) doring recent years have been as under:—

		3		
Ycor.				Aores.
1895-1896		•		85,196
1896-1897	•	•	•	99,383
1897-1898			•	94,321
1898-1899		•		91,858
1899-1900	•			91,981
1900-1901				78.849

I imagine the falling off this year has been due to the decreased supply of water in the wells following on a succession of droughts. The number of new wells constructed dering the last ten years has not yet been ascertained. Construction has been assisted to some extent by tagdi. I consider the advances as now made for this purpose are liberal eaongh. No inducements are required; it is the complexity of the system and the delay generally involved, as well as the fact that he hardly ever gets as much as be sake for, which put the rayat against tagdi in many cases. Wells in this District were seriously affected by the recent drought in nearly all the supply greatly diminished and in many it ran dry altegether. Bering with a "jumping-bar" aided with blesting powder proved wonderfully soccessful in mony cases, but failed in others. I cannot give numbers. Depth of water in wells varies immensely: in coils where there is no rock water is often found 15 feet below the sarface, in rocky parte soldem less than 30, sometimes not even at a depth of 100 feet, below which borings are burdly over made. An ordinary well for irrigation costs about Rs. 300. The area sorved varies with the cize of the well and the nature of the cultivation. Six acres at a time might be an all-round nyerage.

Point 8.—The mediating character of the District I imagine the falling off this year has been due to the

Point 8.—The undulating character of the District renders it absolutely free from water-logging.

Point 9.—Is Public Works Department matter as far as statistics go. All the incomplete works mentioned under point 4 anght to be completed as soon as possible, but Hotgi and Pathri are less urgent than the others named. The reason is the uncertain character of the rainfall in this Dietrict which is nototious. I have heard that some small (village) tanks in the Karmala Talnka, constructed as famine works in the femine of 1876-77, have become practically nesloss owing to want of maintenance. I have not yet seen them, but will have my ovidence on the point ready by the time the Commission comes to Shelapur.

Points 12, 13 and most of 14 nro not in my province. No whole villages are protected by the irrigation schemes in this District, so the necessity for relief in a famine year is not anywhere entirely obviated by them.

- Gonoral.

- 1. The Solaper, Barsi, Madha and Karmala Talekas of the Sholapur District. I have held charge only eince May last (aix months) and have travelled in those talukas very little, but I have visited them all off and on. Consequently I cannot profess to know thom at all intimately.
- 2, 25 inches is about the average fall for the year. I have not got the menthly figures.
  - 3. (1) No.
    - (2) No.
    - (3) Yee, I think manure would fall short.
- (4) Nearly all the culturable land is suited for irriga-

- (5) This difficatty has not occurred in the tanks now in use except in years of actual drought, s. c.-just when the weter is most wanted.
- (6) No. . (7) Not at all. (8) No.
- (9) The chisf reason which militates against extension of large irrigation works in this District is, 1 helisco (it is a technical matter), paccity of sites for tanks. Irrigation from wells is capable of almost indefinite extension.
- d. Land is exempt until the experience of the current revenue ectilement, which remains in force for 30 years. Exemption is secured in practice by leaving things as they are. I cannot say what the case may be with tenants and their landlords: it would dopend on the length of the lease: I consider the existing provisions sufficiently liberal: no one ever complans of the assessment or the water-retes.
- ever complans of the assessment or the water-retes.

  5. Not very freely: the only hindrance, I think, is the nufamiliarity of the rayat with the system and the bother he is put to to get an advance which, if he gets it, is often too late or too small to be of much reat use. Much can be done by systemalizing enquiries instead of souding potitions, received at any time, from pillar to post, as is often done. The Sub-Divisional Officer can rashy put things on a more husiness like basis. But many difficulties are insaparable, i. e., the land in which the well is required is often mortgaged, and this always complicates the procedure and often proves a her to the loan. Interest and instalments are liberal enough. Remission in cases where the attempt to obtain water fails should be (ond I believe is) allowed to the exteat of the money actually expended. No other concessions ore, in my opinion, required: no rayat considers our present terms envasionable.

  6. No; irrigation is too sparse here for that.
  - 6. No ; irrigation is too sparse here for that.
- [ Qoestions ? to 83 I cannot answer. I have hed no experience of irrigotion, canals or tanks previous to my arrivol tu Sbolapur, and very little since.]
- 34. (1) About 15 feet in soft strate and 30 in recky
- (2) Percolation os a rule or minute springs which cen-not be distinguished from it.

The level always gets low in the bot weather, and water is liable to fail altogother when there is real drought.

- I have not seen any cases here of water getting salt in the hot weather.
  - (3) Rs. 300.
- (4) For over, if kept in repair and free from inundation
  - (6) By water bogs (mot).
  - (6) Twenty nores.
  - (7) Six ocres.
- (7) Six ocres.

  35, (1) Given a sufficiently large holding and enough live stock and manure, a man can in an ordinary year double-crop parts of his land, but not the whole, if he has a well. But this takes a lot out of the soil and means constant labour. Ordinarily not more than a quarter of the area commanded would be irrigated in any one year, and a doable-crop once in four years would not do undue harm, given, as observed above, pleuty of meaure. In practice, however, not more than helf the land irrigated would be sown with dry crops in the same year. sown with dry crops in the same year.
- (2) In an ordinary year the irrigated crop is almost always of the more valuable kind, chiefly makka and angarcane.
- (3) I do not think n well is often used to increase the outturn in a good year. It is in years of scanty rainfall and of actual drought that a well is chiefly neeful, as it is and of actual drowth that a well is chiefly neoful, as it is then that it makes the difference between poor or no crops and good crops, to say nothing of its powers of producing fodder. But of course onything like n fall yield over the belding is impossible whoe well-water takes the place of rain; even were there a well in every field and water in plenty in every well, the lahour necessary to irrigote the whole would never be avoilable unless the existing stock of bullocks were moltiplied over and ever agoin. Thus wellscan he and are a great pallietive, but not a complete preventive, of famine due to failare of timely rain.
  - 86. (1) I cannot.
- (2) Total drought and perfect irrigation woold mean a proportion of ? 1, i.e., infinity.
- 37. Government nescessment is roughly Rs. 1.2.0 per acro for bagayat; 12 acras for jirayat. The rent of a field

is trippled or quadrupled by the existence of a well: per nere bagayat ront would work out to shout Rs. 5, jirayat to about Rs. 1-8-0 or Rs. 2.

38. Water is generally to bo found in the valleys where 38. Water is generally to be found in the valleys where there is black or other deep seil, and outlivation shounds. Unoultivated uplands, or outlivated parts where muram is near the surface and solid rock a few feet below, are usually hapeless for horing purposes. Inasmuch as most cultivation is in the lewer-lying lands answering to the first description, there is not, as a rule, difficulty in fluding water by boring or digging in the fields. But village sites are often, indeed generally, on comperatively, high rocky ground, and hence it is not infrequently hard to find water for demestic purposes near the place where it is most required.

- A good deal was done last year in the way of baring and blasting in wells of which the supply had run dry, generally with success. But this was in the case of existing wells. I am not awara of ony cases where trial horings were made or tools lent to individuals. I do not think trial horings would be of much use here, because, as I have said borings would be of much use here, because, as I have said water can generally be got in the lowland fields, and in the high ground wells are seldom required except for drinking Imposes, whon it is hest to bore the already existing wells.
- 39. I think that, with the consent of the occupant, Gererument might undertake the construction of wells in private holdings, charging nathing, but recouping themselves evolutely by the increased bagayat assessment. But diffi-
- 1. Q. (The President).—You begin your note by saying you hove only nine menths' experience of the Decean, nod that you were previously in Gujarat. What district of Gujarat were yeu in ?—I was one year in Ahmadabod and 3½ years in Broach, after that I was Personal Assistant to the Commissioner and he sent me all over the famine district. districts.
- 2. Q. You say in the first page af your memorandum "the block coll of Shelapur can he, and is, as a matter af course, irrigated with success, whereas irrigation of cetton soll in Guzeint is, as far as my experience goes, a folluro." Have you seen them irrigating the black soil freely here? -Yes.
- 3. Q. Has that been en account of the extreme drought da yau think in a normal year they would have irrigated it?—It is black seil which would toke water in ardinary years, it is not black cotton soil, that is very different.
- 4. Q. Supposing any large scheme for irrigation is hit npon for Shalapur, could one count in normal years upon the water being freely taken in bleck soil?—I thick so,
- 5. Q. It is quite different from the Branch seil !- Yes. quita.
- Guita.

  6. Q. Alluding to advences you say "I censider the advances us now made for this purpose are liberal enough. No inducements are required; it is the complexity of the system and the delay generally involved, as well as the fact that he hardly over gets as much as he asks for which put the rayat against tagai in many cases." It is an extremely importent thing that a man should take advantage of the system with a view to the extension of the well irrigotion af the country; do you suggest any means of furthering it P—If we could get things do no a little more premptly than they are new, it would help.

  7. O. How leng does it take a man te get an advance.
- 7. Q. How leng does it take a man te get an advance from the time he makes an application?—It depends upon the system which is established in the sub-division; if you go in for a system of written petitians which have to go fer repart to the village officers and theu come back, it may teke six menths, but if it is systematized, I think, I could guarentes to da it in a month.
- 8. Q. Is it the Mamlatdar whem one must rely upon for information about it P-Ne, it is the village afficers.
- 9. Q. Cen you see my way of simplifying matters. plifying so as to make thom premptor and easier P—I think paper writing should be as far as possible abeliahed. In the taluka for every payment mode no less than nine different documents have to be executed, that three time.
- 10. Q. Are these documents simply bearing upon the an's credit security, bona fides, atc. ?—Yes, and some are man's crodit security, bonh fides, atc. ?—Yes, at simply necount matters, taking signalures, etc.
- 11. Q. You think that kind of thing is over-dene?-Yes, very much so.

culties would undeuhtedly supervene, e.g., the uliquotian Mr. H. L. of parts of the land commanded by the well, when disof parts of the laud commanded by the well, when disputes os regards the rights of the porties over the well might follow. If, however, the well were made Government property in perpetuity, Government would always he in a position to direct who should have the use of it. I feer that at this best the complications which must cusue would go so far to annihilate the assistances of the scheme, but it might be tried, especially in vatan lands or lauds occupied on the new non-tronsferable tenurs. Current repairs to such wells would have to be effected by Government, and this would no doubt be a heavy charge; but if experience showed that these expenses oud the initial expenditure could not be recouped by the ordinary bagagas excess over the dry crop rates the former might legitimately be increased in such cases. creased in such cases.

creased in such cases.

40. Yes: temporary wells, or helas, as they are called me often dug in the heds of watercourses to provide water for drinking purposes and for watering cattle when other oupplies are searce. Water is also occasionelly lifted from them by mets for irrigation. The water is usually to be get of a depth of three or faur feet. Inasmuch as a fairly large watercoorse is a sine qua non, such an expedient can only be reserted to in very limited arcses, and a hela only lasts for one dry senson. I do not think much encourogsment is nechel: a 'nita costs pradically nothing.' Liut as it is, sums have been given in many villages from Government and Local Fund grants for the constraction of such temperary supplies. temperary supplies.

- 12. Q. Is that due to undue caution on the part of the establishment concorned or is it simply the insistences of red tape?—These nine documents are entirely red tope.
- 13. Q. You say that the rayat rarely gets as much as he asks for; what prevants him getting what he asks for?—Generally I think the impossibility of knowing exactly hew much the work will cest and a certain amount of suspleion as to the genniueness of the application.
- 14. Q. (Mr. Ibbelson).—What does "geunineness" mean?
  —A man will ask for ks. 50 to deepen n well, he may
  deepen it 2 or 3 feet, yen den't knaw if he m isoppropriates
  helf the sum received or not.
- 15. Q. (The President).—Is it possible to control that ?—I think so, by visiting the place and making the mnn point out exactly what he wants to do and then having on estimete made, but you want a certain emeunt of skilled assistance for that.
- 16. Q. This visiting and making enquires is that asking from the Local Government efficers more than they have time to do ?—No, not fer wells, but fer seed and cattle would be a different matter.
- 17. Q. If a man asks for Rs. 500 to make a well and you have reason to believe that that is the cost of the well, would you give bim the whole amount?—Yes, I would give it to him.
- 18. Q. Mr. Macenochie said just now that in order to make the money go as far as possible it might be desirable to give only half the amoent asked for f—1 den't think it has been necessary where I have been. We have always had as much as we wanted.
- 19. Q. Havo yau yourself seen much of this well deepening by blasting ?-Na, not much.
- 20. Q. You say on page 3 " all the incomplete works montioned under point 4 ought to he completed as soon as pressible, but Hatgi and Pathri are less urgent then the others named." Why do you say preference should he given to the others?—Because Sholapur and Barsi talukas are much less liable than thoothers to famine.
- 21. Q. You say "I have heard that same small village tenks in the Karmala toluka constructed as famine works in the famine of 1876-77 bove hecame practically useless owing te want of maintenence". Coming from Gusorat here I suppose you see a great difference in the number of village tanks?—Yes, in Guzorat every village has a truk, here it in quito the exception.
- 22. Q. Would yan sey that the neture of the country, the general amenut af slape, etc., is sufficient to account for that here, is it possible to make tanks here as easily as in Gujaret?—I think almost easier, I don't know why they have not got them; in Gujarat you have to dig your tank ant of the flat plain, here you only require to make a hund.
- 23. Q. (Mr. Ibbetson).—Da they grow much rico here?
  -No, very little indeed.

4 Jan. 02.

Mr. H. L. Painter,

4 Jnn. 02.

- 24. Q. (The President).—Have you seen these large tanks in the district; do the people seem to appreciate them?—Yes, there is only one in my sub-division—the Ekrak, the Ashti is on the horder, I don't know much about it, as the cauals are in the other charge.
- 25. Q. You say on page 3 " the chief reason which militates nguinet extension of large irrigation works in this District is, I helieve, (it is a technical matter) pancity of sites for tanks." You don't apply that to villoge tanks?—No, large tanks.
- 26. Q. To go back to your former place, Gujerat, if in the Dietrict of Broach, for instance, there had been irrigation from the Inpti in the last few years, do you think the people would have availed themselves of it?—Yee, I think they would have tried it, hat I doubt if it would have done yery much good.
- 27. Q. Famins is very rare in Snrat and Broach, what measures do you think would be best to employ for protecting them in case of a famine?—I don't think you can protect Broach.
- 28. Q. Looking further jup at Kaira, Ahmadabsd and the Panch Mahals, there irrigation could be used to any extent?—Yes, in the light coile.
- 29. Q. Could the Sabarmati and Mahi be drawn upon?
  —I dou't think so, I don't know much of these districts, I was there a very short time.
- 30. Q. (Mr. Higham).—You say that irrigation from wells is capable of indefinite extension in this district, is that in all parts of the district?—Yes.
- 31. Q. In regard to the question of advances for them, I see you also say that one reason why they don't apply is, not only is there delay but they don't get as much money as they want; do you mean that they don't get as much money as is necessary to make wells ?—Yee, in some cases.
- 32. Q. Supposing it was decided to take some heroic measures for cucouraging the construction of wells in any taluka, do you think it would be facilitated by putting a special officer on the work, who would have authority to make takavi advances within a certain time; he would be given an establishment for making trial boriugs and that sort of thing, and he would examine on tho spot all applications made and make advances by instalment se work was carried out?—Yes, I think it would be good in a way, but it would he availed of to a very small extent, people ask more for money to deepen wells than to make new ones.
- 33 Q. That would a part of the goneral sebemo; the officer employed would in time become an expert and pass on to another taluka?—I think it would be a good thing.
- 34. Q. You don't think it would be lend to any increase in the number of wells ?—I don't think it would make very much difference. I don't think it would be worth while, on the whole to make special efforts.
- 35. Q. You would avoid the delays of which you speak and you ensure the monoy being speak for the purpose for which it was required, and get a good idea of the money actually required for the purpose P—I think it is only a question of lecal management.
- 36. Q. Local management cen he availed of, but in practice it is not possible, except where you have an officer who takes a special interest in it; supposing n revenue officer, eminently fitted for the work was put ou, do you thick it would he n good plun ?—Yes, I think so.
- 37. Q Do you think it would be sufficient to trust to local cetablishments?—I think they could deal with it.
- 38. Q. Of course the man would be working under the Dietriot Officer, not independently !—It would be worth trying, I think.

- 39. Q. (Mr. Ibbetson).—You say in your memorandum "land is exempt until the expiry of the current revenue settlement which remains in force for 30 years." Is there any exemption beyond that when the ectilement is revised?—I understand that if a well is dag in jarait land, when the new settlement comes round, it is essessed as bagait.
- 40. Q. You say also "remission in cases where the nttempt to obtain water fails chould be, and I believe, is allowed." You are not sure about that?—I have never known a case.
- 41. Q. (Mr. Rajaratna Mdtr.).—You said that nine documents have to be drawn up in connection with the grant of takavi; have you thought which of these could he dispensed with ?—I think all could be dispensed with except the receipt for the money. I think the bouds could he done away with.
- 42. Q. It is that which gives you authority to recover the money?—I believe we have authority without the bonds. We can recover arrears of tokavi like mrears of land revenue,
- 43. Q. (Mr. Ibbetson).—There are us houds taken in Northern India, the land is hypotheented hy means of a morlgage. Do you make a man exceute a formal mortgage?—Yes in 99 cases out of 100 it is deue; you can take personal security.
- 44. Q. (Mr. Rajaratna Mdlr.).—It is n question whether in the absence of that hond Government could recover ou land that was already mortgaged?—If we find that the land has been mortgaged, we do not accept it as security.
- 45. Q. (Mr. Ibbeison).—Are you quite sure about that P.—In practice that is the case.
- 46. Q. Although the law provides that laud revenue should take precedence of that pre-existing mortgage?—I am sare it is the practice.
- 47. Q (Mr. Rajaratna Malr).—Does not the law give the rayat exemption on account of improvements?—I den't think so.
- 48. Q. In paragraph 39 you say "Government might undertake the construction of wells in private holdings charging uothing hut recomping themsolves eventually by the increased bagait assessment." At what I rate would you fix the bagait assessment —It would be fixed according to the ordinary principles, without reference to the ownership of the well or the cost of the well.
- 49. Q. That onbanced assessment covers a certain proportion of the interest; Government has to horrow mousy of 34 per eent., would you adopt that as the limit?—I would ignore everything with reference to the building of the well hy Government.
- 50. Q. In the same paragraph you say "but difficulties would undoubtedly superveue, e.g., the alieustion of parts of the laad commanded by a well?"—I menut to say that the owner of the well itself might refuse to allow other people to use it, although it was originally intended that the land should be covered by the well.
- 51. Q That is a matter for private sattlement; they could always establish their rights; how would the difficulty orise?—It would mean complications I think; for two or three years nobody would he able to use the well.
- 52, Q. Government could recever the mocoy I suppose f—The question I was thinking of was that the person to whom it was alienated might not be able to get the use of the well.
- 53. Q. That is a matter which concerns him and not the Government?  $\sim$  Yes.

WITKESS No. 65 .- The Reverend Mr. H. GATES, Sholapur.

Mr. H. Gates. 4 Jan. 02.

- 1 Q. (The President).—Have you been long resident at Sholapur?—About 25 years.
- 2. Q. You know the district well and have seen it through its times of familio and prosperity. You are resident in Sholnjur itself?—Yes.
- 3. Q. After the experience of these last end years, what do you consider would be the best and most reasonable measure for Government to take, in order to make the physical and moral distress less on the recurrence of a famine?—I have thought of this question considerably and of ways of getting water; there seem to me to be only two ways of getting it: first by raising it from the ground, and, secondly,

hy taking surface water. I think that an improvement is possible in both these ways. I am not confident that much can be done in the way of Artesian wells; the strata of rocks are too level for success; there must be no variation in the under-lying impervious strata; there are some variations in places where water can be more easily obtained than in others, and I think it would be well to find out where these places are so as to help the people to get water. I have not had mach experience in well horing, although an experiment was tried in Sholapur, but it seems to me that if well horing machinery were introduced by Government, trial borings might be made in certain places, eo that the people could find out where they would be likely to find water; if, for instance, eucl machinery were put in the

hands of the Collector, it could be sent to different sections of the Collectorate and trial borings made; and I think it would pay. As for surface water, every year cesans of it goes away into the Siaa and Bhima rivors. India has the largest rainfall of any conutry in the world and suffers near from famine; why cannot we catch the water in some way? In Southsrn India they store water in tanks, there the sarface of the ground is more lovel than it is here, it is easier to take water out of rivers because the rivor beds are shallow; here it can be managed if dams are put across the Sina and Thima river beds and the water turned off and stored in large tanks. I think the water could be used for irrigation, or, if not, it would raise the goueral water-level of the soil. Another schome I have dreamed of for years is to put large dams across the Sahyadri or Western range of meantains, put large dams in the valleys—there is a minfull of 100 to 400 inches and it is of no use to anybody—the land is higher than most of the Decean, and slopes to the east. Why cannot large tanks he made there? I am not an Engineer, hut it seems to me something of that kind might answer. In Mahableshwar, we have had 400 inches of rain, and I have seen places where a dam could he put and where an immense amount of water could be stored. There may be difficulties that I don't see. One Engineer told me that this water would not he very useful near the dams, hecauss there is a pretty good rainfall every year, hut I don't think that is a sufficient objection.

- 4. Q. Do you think that in a year of normal rainfall in this district the rayat would avail himself of each water or water from the tanks?—I think he would.
- 5. Q. Would he take it for his staple dry crops?—He would take it for the crops he thought would pay best—juari or some other.
- 6. Q. There is no question, do you think, that the water would be disposed of? I think not.
- 7. Q. Elsewhere, where there is heavy black cotton soil, we have been assared that the rayat will only under great extremity take water; the works you have suggested would fall on the tax-payer, and it is highly important that some water-rate be paid, not only once in a dezen years but every year?—From all I know of the people, I think they would be glad to take the water.
- 8. Q. (Mr. Ibbetson).—They don't take water from existing tanks in ordinary years at present, that is one of the great difficulties here, why is that ?—Government can answer that question better than I can.
- 9. Q. (The President).—Mr. Beale, would you say that the evidence is souclusive that tank water is not availed of P

- (Mr. Beale) .- I think so.
- 10. Q. (Mr. Ibbetson).—Do you still think that water brought at this onormous cost would, in ordinary years, be used when the water that is there is not used? The people seem anxious to take the water.
- 11. Q. Do they ever give reasons for not using the water that has been provided already at considerable cost?—I don't remember hearing any reasons.
  - 12, Q. You didn't know the fact perhaps ?-No.
- 13. Q. (The President).—I suppose the fact is that in a normal year dry crops require very little more water than the heavens give ?—Yes, but there are lands above the black soil which might require water.
- 14. Q. Take the Ekrak tack, do you think it commands any lands of that description?—Yes, black soil is sometimes found on high lovels and sometimes on low isvels, and between them you will find red soil or moorum soil, which requires more water than black soil, you can raise anything on that, if you have plenty of water.
- 15. Q. From your intimate knowledge of the people, do you find that they appreciate the system of takavi and are glad to avail themselves of it?—I think so.
- 10 Q. Do you hear complaints of the formality to be gone through and of monoy sticking in the fingers of those it passes through?—Yes, I hear frequent complaints, the Patel and other underlings require their fee.
- 17. Q. Do the people go more readily to Government than to the sewer ? -1 think they do.
- 18. Q. You have suggested that the Collector might have boring machinery for testing for sites for wells, have you any other suggestions to make which would accelerate the increase in the number of wells ?—I don't think I have.
- 10. Q. Do you think the amount of interest—it is 6 per cent. in this presidency—deters them?—I don't think that is too high. I think generally people would rather go to Government and deal with Government than with the sowcars, because the sowcars would try to get the fields into their own mea.
- 20 Q. We have had complaints made of the rigidity of the Government payments; it is said they have to be made whatever the season is like, and that the sewer is more or loss pliable; what is your opinion?—I have found that these people always have semething to complain of, any way.
- 21. Q. You don't think they have reasonable grounds for complaint as regards that?—I have not that impression.

WITNESS No. 60.-Mr. GANESH PANDUBANG THAKAR, B.A., District Dopnty Collector, Sholapur.

Answers to printed questions.

2. In my subdivision the areas are as follows :-

Namo o	l Taluko.		Grozz arca.	}	Cutturat area.	olo
Pandharpur Eugola Maleiras	: :	, ;	A. 306,039 414,033 8,67,532	g. 301 201 0	A. 238,873 334 368 217,421	
	TOTAL	-	1,001,025	10]	£10,662	26%

Protected areas.

Name of Taluke.			Name of Taluke.			BT IRRIOA- WOREH.	PRIVATE OR WELLS. WELLS.		LLS.	Total.	
		~~~			Higheat 1899-1900.	Lowast 1895-96.		Highest 1899-1990.	Lowest.	Highest	Lowest.
Pandharpur . Sangola Malsiras	:	•	,		0,518 2,291 3,084 800			8,247 15,317 14,003	6,827 7,515	14,766 18,381 14,098	9,118 7,516

Mr. H Gates. 4 Jan. 02.

Mr. Thakar. 4 Jan. 02.

Thakar. 4 Jan. 02.

These figures are taken from Mamlatdar's records und are of tvery correct. weterings; but cortainly not so much as in the case of prolonged dronght. not very correct.

The irrigation figures for Minswad Tank are 13,656 acres in 1899-1900 and 3,481 acres in 1895-96 for Pandharpur and Sangola together.

In Pandbarpur and Malsiras the land on the banks of the Bheema is vory rich alluvial land, hat as you go farther towards west it becomes ordinary block soil and then gradually submerges into light muram self-fit for kharif crops only. In Sangola, though the taluka is traversed by the river Man, there are no alluvial deposits on its banks and almost the whole taluga is light muram land of a very inferior quelity. This kied of land is however well soited for un irrigation work to be profitable.

If the rainfull is sufficient and sessonable no artificial or failure of rainful is summered and sessons on a children irrigation would be necessary for ordinary orops. In case of failure of rainful nearly gets would require artificial irrigation. Even in the year of normal minfoll artificial irrigation would increase the productive capacity to a small

Average rainfall is-

				]	aches.	Cents
Pandharp	u <b>r</b>	•		•	25	33
Saugola					23	35
Malsiras			٠.	•	21	82

If the rainfell is normal, there is no demand for ordinary orops in good soil, but in light soil there is always a demand for irrigation water even for ordinary crops, because the normal rainfall is not sufficient to raiss as good erops ac can be roised by the irrigation water. For superior crops there will always be a demand for such water.

Namo of crop.	Number of waterings required.	At what times of the year.
Ground-nut	15 to 20	June to January.
Sweet potato	20 to 25	For 8 months at any time of the year.
Chillies • •	20 to 25	Jnne to December.
Sugarcane .	60 to 60	Throughout the year.
Hoondi	8 to 10	Any time, but naually be tween March and July.
Khapali wheat .	8 to 10	November to February.
Moizs	8 to 10	Any time, but usually be tween March and July and June and September
Vegstables .	20 to 25	At all times according t season.

Distribution of canal water is controlled in the following

Some specific period of time, say, a week or ten doys, is assigned to each group of holdings. The Patkaris or Karkuns appointed for the purpose allow the quantity required for the group to rnn into the brauch channel assigned to the group, and the owners of holdings take the required quantity from the channel. Sometimes the owners of npper holdings take larger quantities and those down helow get less. But usually care is taken that equal distribution is made.

Every year the crops enjoying irrigation are measured and the assessment calculated on them according to the smectioned rates. The revenue is recovered in cosh by the Revenue Department.

3. There are no such tanks; but from the experience of small dams thrown across small streams to collect water for crops requiring more water it would uppear that tasks constructed in black soil will hold water.

When the laud irrigated is a black soil there is some demand, but very slight, for water oven during sessons of normal rainfall for crops requiring regular and frequent

In such soil the irrigated area does show a falling off in years of fair rainfall.

The revenue is more precarious.

No. Not much desire if the rainfall he normal.

No.

4. The information required in this question would be hest given by the Irrigation Department.

There are only two canals in my charge, Mhaswad and

The estimated annual irrigating capacity of the former is, I think, 106,000 acres, but there being some defects at the headwork and in the lice, the present actual capacity is, I think, only 27,000 acree. I have no information about the other tank.

To a considerable extent, especially in the case of Mbsswad Tank, its catchment area being very large.

My information is that there is one good site for a tank on the river Bheema near Shankargaun on the river Man near Nuzors and on the river Nira near Kurhavi. Thoro are also good sites on the smaller strenms, one near Sanond, one accor Nimgnon, one near Gardi, and one near Woki.

I heg to soggest the folling conrece of irrigotion :

- (a) The leakago water of Mhoswad Cooal runs through ne leakago water of allosswad Cooli russ through some streams in large quantities. Small mesonry dams may be thrown on them at conveniont sites, and the running water utilized for irrigation. The cost will not be more than 1,000 to 1,500 rupees in each case, and the works con be outrusted to the Local Boards.
- (b) At convenient sites small storage tenks may be constructed and they may be filled by feeder cannle by the water of the Man River which escapes through the wasto weir during measons. These small tanks will be able to irrigate, say, 200 to 500 acres in each case.

I beg here to suggest that land-holders should be eucouraged to make their fields level and to throw small dams around them as in the Konkoa, so as to retain and turn to account every drop of water falling from the skies. At present the laods are so sloping and rough thet mob of the water of a heavy shower—main usually falls in such shower in this part—rune over the ground and is wasted.

- 5. No provincial works in my charge.
- 6. No such works in my charge.

There are a few kachcha bandharas or temporary water courses earrying a small quantity of weter to lauds. The holders enjoying the irrigation throw an earthern dam every year and carry water. If the water fails remissions are granted. There is no responsibility on Government for their up-keep. These may be made into masonry bandharas and new ones constructed as suggested under reals. and new ours constructed as suggested under reply.

4. These will be very useful as protective works. Their value concerning villege water-supply will not be much. Small tanks dependent on fainfall constructed as villege, works will not be of much use for irrigation. They are not wanted for men or cattle as the wants of the latter are otherwise satisfied.

7. Total nren irrigated by well :-

Tn	loka.		In ordinary yoars.	In years of drought.	
				As.	As.
ur		•		7,000	9,500
•			•	14,000	16,000
• •	•	•	•	· 11,000	14,000
		Tnloka.			As

Note.—These are rough figures; authentic information as to the total number of wells and the axes under their command has not yet been received.

The extent of irrigation depends upon the quantity of water available in wells.

, 11

· Number of wells constructed samually during the last ten years ;-

Yea	r.		Pandharpur.	Sangela.	Malsiras.
1691-92			***		
1892-98		•	4		
1893-94			5	•	
1894-95		•	3	<sup>1</sup> g	eived
1895-96		•	•••	Ocoiv	t rec
1896-97			120	Not yet received	Details not received
1697-98			77	Not	Detai
1898-99		i.	7	-	
1890-1900			15		
1900-01		•	29		
			•200	<b>†102</b>	1707

- All by tagai ; 47 more by private capital.
- † 102 by tagai during the last ten years. Number constructed by private capital not yet known.
  - # Half by tagai and helf by private capital.

It is desirable to encourage well construction by larger

No cencessions other than those given in the rules were allowed except in the lost two famice years, when partial exemption from interest and postponoment of repayment were granted. Almost all the wells were affected more or less by the dronght of 1899 to 1901, but many of them ontained some water which was sufficient to raise ordinary foed crops instead of rieber crops.

Yes. Many were deepened and the deepening was generally successful in obtaining more water.

Number fuiled or abandoned.

Information not available. I think about 15 to 25 per cent. of the whole number.

30 to 40 feet below surface.

Cost from 500 to 700 rapees.

Area served-about 10 neres for middle class; 2 for saperior and 15 for ordinary crop.

8. There are no parts to my knowledge in which lands or crops are injured by water-logging. No drainage work required any whore.

required any whore.

There is however a popular complainant that the canal water injuriously affects richer lands and makes them unproductive after a continuous irrigation for 10 or 15 years. According to their ideas the land-holders explain the phenomenon by saying that the canal water being stagmant is colder than, and therefore not so healthy to crops as, well water. I am not satisfied with this explaination. I do not understand why stagmant water should deprive the land of its productive capacity more rapidly or completely than well water. What I think the reason of canal water impairing the productive capacity to be is thet it is given to lend indiscriminately in much larger quantites than the well water, being less expensive and more abundthan the well water, being less expensive and more abundant. The lands seak it to a great depth where the moistare remains undried, being beyond the reach of the surface

sun-hent. It is said that the saline efflorescence begins low down underground and gradually rises up to the sarface. This ovil result can, I think, be avoided if a smoller quantity is allowed than at present either by reducing the quantity given at each time or by making the waterings less frequent.

General desciency of meaure is another cause. Manne is very costly and scarce in these parts and is consequently not given to lands in such large quantities as are necessary to replenish their productive capacity which is being rapidly deteriorated by the continuous caltivation of saperior crops which being more profitable the land-holders are induced to make without intermission or variation. If a cheap and lessally procurable artificial manure can be suggested this defset can be remedied to a great extent.

9. In the last two years' famine two irrigation tanks the

9. In the last two years' famine two irrigation tanks, the mstelling of three roads, and the repair of one villege tank were undertaken. They are completed except the two now irrigation works. It seems most desirable to bring about their early completion as they will be of mach use in generally improving the condition of the sarrounding country apart from their great value as protective works in times of drought. No village tanks constructed. No experience is yet gained about the Karkump Tank; but there is much room to hope that it will romove the present great scarrity of water felt at thest place, and fill with water all the sarrounding irrigation wolls which had become almost dry during the last two years.

14. Protective value of the two irrigation works in the 9. In the last two years' famine two irrigation tanks, the

14. Protective value of the two irrigation works in the famine sines 1897 has been considerable.

Arons irrigated are as follows :-

	Year.				Mhsswad Canal.	Ashti Canal.						
					As.							
189ā·96		•	•		3,481							
1896-97		•	•		7,547	ined						
1897-98			•		6,133	Not obtained.						
1898-99			•		6,101	Not						
1899-00		•			13,656							
1900-01		•	•	•	5,842							

It was the failure of the water, not the unwillingness of the people, that has so much curtailed the irrigation area in 1900-01.

Some persons went on relief work and some were also on dole in the villages protected by irrigation works. But the proportion was considerably small. Had the works been not in operation abent 10 to 15 per cent. more of the village population would have sought for relief.

villago population would bave sought for relief.

Comparing an irrigation work with wells lot us take Masswad Tank. The initial cost is about 20 lakhs. A well ordicarily costs Rs. 500, so there will be about 4,000 wells by sponding 20 lakhs. About 25 per cent. will fail or have scanty water. The remaining 3,000 will irrigate about 30,000 nores of ordinary crops, whereas the capacity of the Mhaswad Tank is estimated at 106,000 acres with a more profase supply of water than well water; besides, no cost of lift us in the case of wells. In this respect irrigotion works are more advantageous; on the other hand, the tion works are more advantegeous: on the other band, the lend becomes peorer by saline efflorescence, which is nover the case in well-irrigation.

- 1. Q. (The President.)—How long have you been in this district ?—Two years.
  - 2. Q. Where were you hafore !- In Kolaba.
- 3. Q. There are three talakas in year cherge?-Yes; Pandharpur, Sangola, and Malsiras.
- 4. Q. The first-nomed is ander the Mhasvad tank !- Yes, and also a part of Sangola.
- 5. Q. The increase in irrigation under this tank is due to the drought. When the drought ceases I suppose the figures will go back to those of normal years ?—No, the people see the odvantage of irrigating rice and other supe-
- rior orops, such as ground-nats and sweet potatoes and they are not likely now to go back to the old state of things.
- 6. Q. Is the Mhesyad tank capable of farther extension for irrigation ?—I am not able to offer an of opinion as I am not an Engineer, but have beard that if certain repairs to the tank were carried out its espacity could be increased.
- 7. Q. Is there much water in the Bhima jast any ?No, it may have 9 inches or a foot.
- 8. Q. Is there a large amount of irrigation direct from its banks P-−No.
- 9. Q. Noithor by mot nor well ?—I don't think the Bhima is saited for mot irrigation on the banks.

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- 10. Q. Why?—The banks are very steep and mot irrigation would be too expansive.
- 11. Q. Are they too high? -Yes; and besides it is a very silty soil, it is not suited for making wells for taking up the water. The Mend river is much mere suitable.
- 12. Q. (Mr. Ibbetson.)—Is there much water in the Mand rivor P—Yes, under-soil water; wherever it is possible, they sink wells.
- 13. Q. As to irrigation under the Mhasvad tank have cultivators to apply before taking water ?—Yes.
  - 14. Q. Have they to apply for every crop ?-Yes.
- 15. Q. To whom it the application made?—Either to the Subordinuts Engineering officer or to the Executive Engineer; ultimately the applications have to go for senetion to the Executive Engineer.
- 16. Q. How long does it take for a man who makes an application to receive a reply ?—About 5 to 80 days, but the applicant generally sends his application in time to allow for that.
  - 17. Q. Bscauss he knows the diffiedlties ?-Ycs.
- 18. Q. Do you think there would be any extension of irrigation if the application oystem were abolished !— What good will that do!
- 19. Q. The rayat would got water earlier ?—I have not etudied that view of the question, but I don't think that would do much good, because the people in oar district are rather dishouest and they might take more water than they are entitled to.
- 20. Q. But they will have to pay for it?—Yes, that is trus; but there would be quorrels as every man would want to have his own way.
- 21. Q. That is the system purened very largely in other parts of India f—Yes, as far as I know. But here application is only n formality. The application goes to the Executive Engineer and he sanctious it.
- 22. Q. Is there any good in it?—Yes, one thing is that the village officers are made to sign the application as colluteral securities for the due payment of the water tux.
  - 23. Q. That is quite usual ?-Yes.
- 24. Q. Do the people take water year after year?—Yes cometimes one oultivator sometimes another, but they all take water.
- 25. Q. You spoke just now of scenrity being taken ?—
  It is a formal thing; the village officers are required to sign the application. The cultivator pays the water rate generally.
- 26. Q. You say, "svery year the crops are measured. The revenne is recovered in each by the Revenue Department." Is a large amount not recovered?—I don't think; nost of the mone, is recovered. I don't think there would be any serious harm in obolishing the system of application in the case of high class corps.
- 27. Q Do you consider that the black soil of the district is generally favourable for prigation ?—No, only red soil is irrigated.
- 28. Q. In normal years would they take irrigation is any other soil f-Yes, black soil, which is not very deep with a substratum of muram will take water.
- 29. Q. What sort of soil is that irrigoted under the Mhasvad tank ?—It is muram; almost the whole of it; a very little is rich black soil.
- 30. Q I gather that the people who have had irrigation throughout the district these last few years go on taking irrigation?—Yes.
- 31 Q. Would that hold good in black soil?—Yes, for soms crops
- 32. Q. You say in page 3, my information is that there is one good site for a tonk on the river Bhima—and on the river Nosra. There are also good sites on the smeller streams. Do you know any of these sites? Have they been oxamined by the Enginer?—I think they were examined some 20 years ago when the site for the Ekruk tank was selected; some 2 or 3 other sites were also examined.
- 33. Q. And objected to ?-Yes, I don't know what the reason was.
- 34. Q. You say at the bottom of page 3, "I heg here to euggest that land-holders obould be encouraged to moke their fields level and to throw small dams around them as in the Konkau." How are they encouraged in the Konkan? Do they get takavi?—They do it rolnutarily because ries crope cannot be successfully raised unless there are dams and the soil levelled.

- 35. Q. How are you going to put pressure upon them here?—I should like to put pressure on them in their own laterests.
- 36. Q. What pressure? Refusal of water until the work is done?—I refer not only to irrigated lands but to all lauds. Famine labour might be employed for the purpose and something might be recovered from the owners.
  - 37. Q. Have you experience of famine labour?-Yes.
- 38. Q. Do you think that it would be n good form of famine labour?—Yee, if the dam work is properly supervised; my ldsa is that it would stop the present waste of weter. I know of soms peopls who have volunterily put np small dams and they got good crops even in famine times.
- 39. Q. What sort of enconragement would you give for well irrigation?—With regard to the distribution of takavi, I think we must have a separate agency, a regular establishment for the payment of leaus.
- 40. Q. Do you think the present establishment is too busy?—Yes; a mamletdar of lowest grade or a hosd karknu of the highest grade would do.
- 41. Q. Do you mean one for each district?—One for each taluka or two talukas at the most.
  - 42. Q. It would not go ou always?-Yes, it would.
- 48. Q. Takavi advances would not be required in each taluka year after year?—For well improvement and woll construction there would always be demand for some years. That, of course, would depend on the circumstances. My idea is that a separate officer must be appointed for that work. He would be part of the Revenue establishment.
- work. Ho would be part of the account of the time being?—Yes. He will have to make snquiries. The Record of Rights will simplify matters; there will not be so much difficulty in ascertaining the value of the security.
- 45 Q. Do you think the people will go on making wolls?
  —Yes. In some parts the well-bearing capacity of the lend has been exhausted, but where there is still scope the people will make wolls.
- 46. Q. What is the case in regard to those parts where the well-bearing capacity has been exhausted?—I'bore, you will find very few places now at which water can be tapped at reasonable depth or at a ressonable cost. My idea is that water can be tapped in the valleys and lower grounds only; as you go up, the difficulty and expense of getting water are enormously increased.
- 47. Q.—Some of the valleys are now fully occupied by wells?—Yes. There is uncertainty about tapping water higher up; that is a great obstacle.
- 48. Q. (President),—Supposing Government were to say, spend what you like in takavi, how much would be the increase in the area irrigated by wells?—My estimate is that it would be almost 5 times the present area.
- 49. Q. The present area waterel by wells is about 15,000 acres ?—Yes, in each of Sangola and Malaines talukas and about 10,000 in Pandhorpur.
- 50. Q. Do you think it could be increased to five times that amount?—Yes, that is the maximum.
- 51. Q. (Mr. Ibbetson).—Fifteen thousand acros for the whole district?—No, for one taluks (Molsims) only.
- 52. Q. (The President.)—What proportion of land generally out be watered by wells?—I cannot give the percutoge.
- 53. Q. Do you think that in Sangola and Pandharpur the arce can be increased five times?—In Sangola taluka the increase would be about the same. In Pandharpur probably less then that.
- 54 Q. (Mr. Ibbetson).—There you do not think the increase would be five times for the whole district?—No.
- 55. Q (The President).—In these two talakas 24,000 acres opuld be irrigated?—Yes, ont of a total area of 700,000.
- 56. Q. The cultivated once of the two talukas is only 580,000?—Yes.
- 57. Q. You could irrigate 1th of the oulturable area? -- No, ubout 12th.
- 58. Q. Do you think in Pandharpur it would be less ? -Yes.
- No; I was speaking about the uncertainty of finding water. The people do not know where water is to be found and so sometimes the taken imoney is speat and there is no well. It would be a great thing if Government were to remit the amount altogether in ouch cases.

- 60. Q. If water is not found ?—Yes, that would be hailed with great joy by the people.
- 61. Q. You do not think that a man who get takavi would say, "I cannot find water" and spead the money on another object?—No. Government would not lose anything. Boring was tried in the last famine, but not to such an extent as onglet to have been done. Government should in every case, send their own officers to select the site, and if good water is found all the onlivators would readily make wells.
- 62. Q. Yon say in paragraph 7, "it is desirable to oucourage well construction by larger advances." Do you
  mean by giving a larger proportion to a man who asks for
  if or by Government giving eaough for the district?—The
  cultivator in our district gets as much as he wants, but if
  we gave them larger sums of money at the risk of some loss
  well construction would be encouraged very mach. I don't
  complain that sufficient sums are not allotted for the district; we get the mency, but there is not much enterprise
  among the people. among the people.
- 63. Q. Do you think much would be done if Government redoced the rate of interest?—I don't think so. The people don't desire anything in that direction; they are quite satisfied with the rate.
- 64. Q. Are they content with the number of years within which they have to pay back the sum?—I think that the period should be increased to a certain extent.
- 65. Q. How much ?-To 30 years; it may be made ooucorrect with the Survey-settlement period.
- 66. Q. That may be only five years !—If takaci is made a part of the assessment that would he, I think, a good plan
- · 67. Q. (Mr. Higham)—Do you know whother a good many small village tanks were constructed in your charge in the famine of 1877-78 ?—I don't know. I was not here at that time, but from what I see I do not think that many were made.
- 68. Q. We have it in evidence that a great many were constructed but are now out of use?—Unless the statistics are collected I cannot say.
- 69. Q. You say that a very small proportion of people went on relief works from the villages that are protested by irrigation. What was the general proportion that went on to relief in other villages?—From 25 per cent. to 33 per cout.
  - 70. Q. For how long ?-Almost the whole year.
  - 71. Q. Which your are you speaking of P-Of 1900.
- 72. Q. Where the villages were protected by cauals, some of the villagers also went on to relief?—Yos, in some villages some people did, in some they did not go. Where they did go the percentage was, I think, 5 per cent. to 10 or 11 per cent.
- 73. Q. Some of them did not go at all f—No; even in the number receiving doles there was a marked difference; the people receiving doles is irrigated villages were very
- 74. Q. In the villages in which relief was applied for what proportion of the culturable area protected by irrigation, was irrigated ?—1 think 20 per cent.; I am not at all sure, but it would be about 20 per cent.
- 75. Q. Where one-fifth of the area was protected people did not go on relief works !- No, that is my idea.
- 76, Q. I suppose in some of these villages a great deal more than 20 per cent. is protected ?-Yes.
- 77. Q. I don't think they irrigate more than 25 per cent-of the oulturable area in ordinary years?—They use water for high-class crops and not for juari and bajri if there is a good rainfall.
- 78. Q. Of higher crops they only irrigate a small proportium ?—You.
- 70. Q. (The President)—Do they irrigate sugarcano?—No, only groand-nots and sweet potatoes, which are middle class crope—not very high, and not very low.
- SO. Q. Is no sugarcane grown f-Yes, there is. In my charge there is a small area under sugarcane; it requires a vory large quantity of water.
- 81. Q. (Mr. Higham)—In dry years, wore there any villages in which half the culturable area was irrigated ?— Unices I see the figures I cannot answer the question.
- 82. Q. Are any statistics kent P.—Probably some might be found in the Agricultural Inspector's office.
- 83. Q. You say the Mhasvad Tank will irrigate 100,000 acree; where did you get these figures from t-From the

- statistical atlas of the Bombay Presidency that was propared sometime age.
- 84. Q. They never irrigate anything like 106,000 ?-No; practically only 12,000 or 13,000.
  - 85. Q. You irrigated 13,000 in 1899?-Yes.
- 86. Q. That is the most that has ever been done?—Yes; not more than that.
- 87. Q. The average, is about 0,500 ?—Yee; my impression is that the capacity could be increased if some improvements were carried out.
- 88. Q. De you sappose that if something is done to improve it will irrigate 108,000?—Ne; not more than 27,003; 106,000 acree is only the Engineer's estimate.
- 83. Q. That is four or five times more than you irrigate at present ?-No, two times.
- 90. Q. As matters stand at present that does not compare at all favourably with wells?—If the full capacity could be got then I think 4,000 wells would not give as much water
- 91. Q. (Mr. Bajaratna Malr.)—How many applica-tions for takawi did you receive in your Divisium during the last two famines P.—More than 1,000.
- 92. Q. In ordinary years how many do you receive? About 150 or 50 for each taluka.
- 93. Q. Don't you think that the existing staff should have been able to deal with them f—Well, they could have, but not in time to be of any use: that is the difficulty.
- 94. Q. Why should there be any difficulty; the Mamlatdar goce about and makes enquiries?-"There would be no difficulty if the Mamhatdar want roam promptly, but he has other pressing busiaess; sometimes he has magisterial work or an omergent report to write; these cause a delay to some extent in the disposal of applications. And then again a man's bond fieles has to be onquired into.
- 95. Q. You could get information of ononmbrances on the land from the negistrar's office?—Sometimes they don't register the mortgages.
- 90. Q. Then they are not valid P-No; in some cases they are not.
- 97. Q. In other cases a registered document is not valid and is no better than an unregistered document P. No, a registered document is better than an unregistered document; but in some cases the land is transferred to rolatives or sub-sharors by a private sottlement, without a doeument.
- 93. Q. I sappose Registrars could give you the information in a few days?—It would take a week, as the registers are not well kept. Then the caltivator might have mortgaged it so long as 50 years ago.
- 99. Q. Special efficers were appointed during the famine to grant takeri !—Yes.
- 100. Q. With reference to the system of applications for water, is there any cortainty under the present system that a rayat who gots water in one year will get it again next year?—There is no certainty; it depends upon the sanction of the Executive Engineer; he may sanction whichever application he likes.
- 101. Q. Does not that to some extent prevent a rayat from sinking a woll to supplement canal irrigation?—No; well irrigation is always considered by the people to be more
- 102. Q. But I refer to wells built to supplement oanal irrigation?—The soil that is favourable for canal irrigation is equally favourable for well irrigation.
- 103. Q. What I you mean is that for high class crops irrigation is required?—Yes.
- 104. Q. In some tanks and causls irrigation is likely to fail daring some months?—Yos.

  105. Q. To supplement irrigation in these menths would not the rayer sins a well if he was certain that the causl would fail !- Yes, if the soil is favourable.
- 106. Q. Assuming it is favourable ?-Y-s, but we thereby give the man who does that the monopoly and deprive others of the benefits of the tank irrigation. Sometimes we give water to one man, sometimes to another, according to who needs it must.
- 107. Q. Could you not allet a definite area to each individual once for all and class it as wet in all ordinary years?—That can be done; but without experience I cannot say whether it will be to the advantage of the rayat or not.
- 108. Q. Why should there be any doubt upon that point?
  -The quantity of water in the tank varies and semetimes there is more to give than sufficient fur the limited area that may be fixed.

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- 109. Q. He could apply for an additional area and pay more. When there is a deficiency of supply the Canal officers give n reduced quantity?—Yes, sometimes the water is only sofficient for the caltivation of orops near the caual and the supply has to be restricted accordingly. Moreover, if, under the fixed area system, the whole of such area is planted with sach crops requiring large quantities of water in a year of drought, the whole quantity in the tank, which could more neefelly be utilized for raising food-grain crops will be obsorbed by the higher crops.

  110. Q. In times of drought you restrict the area proper-
- 110. Q. In times of drought you restrict the area proportionately?—Yes; the available water is turned to the best advantage for growing food-grain crops. However, some such arrangement as you suggest might be tried for 3 or 4 years in the parts where search; is experienced.
- 111. Q. In perograph 3 you say, "from the experience of small dams thrown across small streams to collect water for crops requiring more water it would appear that tanks constructed in black soil will hold water." Have you personal experience of this?—No.
- 112. Q. Are the soggestions you make in your memarandnm heing carried out?—I think they are boing given definite shape to in the office of the Executive Engineer.
- 118. Q. Do you know if ou enhanced a eessment will be charged at the next revision of settlement on load irrigated by now wells P—No; I don't think anything extra will be charged, because it is an improvement made by private capital.
- 114. Q. If the class of cultivation is changed the assessment is increased?—Yes, only if the nature of the soil is changed by patting manure, by levelling the ground, etc., which is necessary in an irrigated plot; but the water-advantage is not taxed as each.
- 115. Q. Are you in fevour of Guvernment making n well and charging on enhanced assessment?—No, I think the construction of wells should be left to the people; the only part that I would recommend Gavernment to take in well construction is to find out and tap the water for the rayat. The rest should be left to the caltivators themselves.

### TWENTY-SEVENTH DAY.

### Bijapur, 6th January 1902.

WITKESS No. 67.-Mn. W. W. DREW, I.C.S., Collector of Bijapur.

Memo. by witness.

M. II. IV.
Drew,

- 1. This District is constantly suffering from feilure of oreps. From 1863-76 there were five or six bad years. Then followed sixteen years of abnormal presperity, but, to make up, the crops have failed five times during the latest eleven years, and there is no reason, that I see, to anticipate that it will fare very mach better in the future, apart from irrigation. In 1896-97 the lete rains completely failed, and in 1899-1900 there was practically no kharif rain, though there was a very heavy fall oarly in September. In the other three years the minfall was not short by more then a very few inches below the average, and yet there was conceining like a 2-anna crop only. This was because the land bere must get not only its average fall almost to an inch, but it must get it at exactly the right moment. The soil ovidently cannot get on, as it used to with a minfall sughtly short of its average. It has been exhausted, as it nover gets monnred.
- 2. The first necessity is to stimulate the rainfall. In 1891 a quantity of dynamito was exploded with this object, but it was done when there was an absolutely clear sky, and naturally there was no result. During the last two measons it looked almost daily as it is meased to cook down in torrents, but the clouds used to pass over simply because there was nothing to bring down the rain. So I recommend that tree planting be undottaken on a large scale. Nothing has been done by the Furest Department here so for. Planting and watering trees might form part of the famias programms too. Suitable places could be found where there would be sufficient water for both trees and workers.
- workers.

  3. Next I think that no unoccupied land should ever be given out without on egreement being taken that the intending occupant will make wells capable of irrigating a half or some other fixed proportion of it. The full assessment of the land is 14 lakhs. In the last two yeers n total of 19½ lakhs was collected, of which 3 lakhs were due to the scare consed by the sudden introduction of the Land Revenue Code Amendment Bill. This year I do not expect to collect more than 5½ lakhs. The cost of relief works, almost entirely nnremunerative, and of grantions relief has been 11½ lakhs in the lost two years, and it will be at a moderate estimate 4 lakbs this year. The uncollected revenue may some of it he eventually collected, but the greater portion will certainly have to be romitted. Eight and helf lakhs have been advanced as Tagni for seed and cattle, of which 2½ lakhs are recommended for remission; and there will be great difficulty in recovering the remainder. So the famine expenditure has been 24 lakhs egainst an income from Land Revenue of 25½. Therefore it is not very profitable to Government to have the land in this District enlitivated as long os it reteams unitrigated, Nor is it to the occupants. They exist only through charity. For better would it be for them to eeck land

- where caltivation is not so precarious. Land unsuited to irrigation or which nobody will take up I would add to the forests. Even if not immediately productive, it would at any rate not increase the number of mouths to be fed in the next year of searcity; oud would afford employment.
- the next yeer of searcity; ond would afford employment.

  4. Speaking as a mon with no protence to eccentific knowledge, I think, that wells are far more suitable to this district than tonks. The only modern tank, at Aluch-kundl near Begalkot, which cost about a likh, is altogether unrommerative, and irrigates only about 40 neres. For it an extra rate is paid by those using the water according to the aereage for which it is used. Other Government works, for which a consolidated rate is paid, irrigate about 1,410 acree, villege and private works 2,200 acres. Fifteenthousand and eight hundred acres are irrigated by welle. The total cultumble erea is 3,227,000 acres. In the lest two years most of the tanks ran quite dry, and they were useless, even for supplying water to the wells by percolation. The beds were given out for caltivation in at least three cases. The large tanks, Sangogi in Iudi tálnka and Hullar in Maddebihal, which ere now being constructed as famino relief works, should, I think, be completed, as so much has already been spent on them, and their catebment area is so great that they would not run dry in any year with as much rain as the recent famino years. Bet smaller tanks, I would not recommend, except as relief works during actual famino.
- 5. We'ls must be constituted by the people themselves, with help from Government. They can do them mach made cheaply than Government cae. They would be suspicious of Government doing work for them on their lands. They would imagine some deep laid sebeme to oust them.
- would imagine some deep laid sebeme to oust them.

  6. More liberal takavi advances might be givee, provided that the work is rarefally watched and the whole advance is not made at eace. To begin with, only enough to each be the recipient to find water should he advanced. When that is spent, if water hes not been found, but the measy has been bonestly spent and there is reasonable chance of its being found, more might be advanced. Money fruitlessly spent in this way might be remitted, even though water were eventually found, and where after diligent search it had to he abandoned, it should always be remitted. Some officials undervalue the security offered, and forget that as the work progresses the value of the security increases. By giving the loan in iastalments a sum safficient for the most pakka well can be advanced with safety. A supply of the best boring apparatus should be kept of the head-quarters of every talaka for the use of rayats requiring them, the hire being treated as part of the advance. This would be especially aseful for deepening wells. The present rate of interest need not be changed, nor need there be more liberal reasissions, except when water is not found. But I would extend the period for

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re-payment to 20 years, so that some of the burden may be borne by the next generation, and to cause inducements to keep up the wells. There is always a tendency not to use a well in a year of abundant rainfall, and, if by any good fortune there is a run of these, the wells fall into discepnix. Last year there were 132 more irrigation wells in the district than five years previously, but there were 68 more in disuse, and of kachcha wells there were nearly 400 more in disuse. It might be made a condition of the lean that not only was the work to be completed in a certain time, as is the practice new, but that it should be kept in good working order till at least the date for repayment of

the last iosialment. It seems to me that it is the best soils Mr. W W. that require the deepost wells and also that suffer most by Drck. a season of seanty rain, and the occupants of those want

a season of sennty rain, and the occupants of those want special oncouragement to sink them. This can be offected best by liberal loans repayable in an extended period.

7. Doubtless a large number of wells ran dry during the last two -yeure, but many continued all through with somewhat diminished supply. Some were despende. Others coold have been, if imploments had been more largely availables. Those that continued were the saving of the District. They inferded work to many and grew much needed grain and still more needed fedder. needed grain and still more needed fodder.

- 1. Q. (The President)—You have been Collector of Bijapur for two years?—Yes; I came here just two years ago at the beginning of famino.
- 2. Q. Do you know the district very well?—Yes; a good deal of my time was spent in connection with the tamine.
- 3. Q. Have you only seen this district during its had times !-- Kin; I was here as Assistant Collector for a year about 13 years ago.
- 4. Q. You say that there were 16 years of abnormal prosperity ?—Yes, 16 years without inmine; there was scarcely such a time before.
- 6. Q. The famine of 1877-78 was terrible ?--Yes; it was the worst on record, but the 1896 famine was very had.
- G. Q. You say "Nothing has been done by the Forest Department here so far. Planting and watering trees might form part of the famine programme." Do you think trees would grow well in this district?—Yes; I know that in Bijapur there were no trees in my compound 15 years ago, but there are a great number now. Trees grow well without much care, but they must be planted near water. near water.
- 7. Q. You propose that "No unoccupied land should ever be given out without an agreement being taken that the intending occupant will make wells capable of irrigating a half or some other fixed proportion of it." Is an application made before ecoupying land?-That was not the system in my time.
- 8. Q. Do you think there would be such a demand for agricultural land in this district as would induce people to make such an agreement?—I think, if they were given taken and told that they would not have the land if they did not protect it by wells as proposed in my memo, they would do it.
- 9. Q. You say "In the last two years a total of 192 lakks was collected of which three lakes were due to the scare caused by the sudden introduction of the Land Revonus Code Amendment Bill"?—Yos; out of 28 lakes.
- 10. Q. You say that cost of gratuitous rollef has been 113 lakhs?-Yes; we find that on the whole we have spent five lakhe more than our income from all sources during the last two years.
- 11. Q. You say "Wells are far more suitable to the district than tanks." What is the variation in the depth of wells !—They are not often deeper than 60 feet.
- 12. Q. (Mr. Ibbetson)-Often less ?-Yes; 30 feet I think somotimes.
- 13. Q. (The President)—Do you find brackish water in these wells?—Yes; in particular parts.
- 14. Q. In large parts of the district !-Yes; a good deal, I think.
- 15. Q. Are wells cut through trap rock?—Yes boriugn great deal of deepening has been done lately.
- 16. Q. Do you consider that a larger area could be cultivated if there were wells P—Yes; but they do not use wells in a good year as it does not pay them.
- 17. Q. Do the people grow higher class crops under wells P—Yes; vegetables and semetimes a little angarcane.
- Q. Is there much black soil in the district? -I think that there is a good doal mare black soil than the other soils in the culturable area, but I am not certain.
- 19. Q. You say the Muchkundi tank is quite unremunerative and irrigates only 40 acres. What other Government works are there?—There are some old works. There is the Mudag tank; which belongs to the Muhamedan times; it is irrigation tank; and under it the people pay a consolidated rate; altogether it irrigates only 1,440 acres?

- 20. Q. Are there any village and private works ?-Yes;
- 21. Q. (Mr. Muir Mackenzie)-In what part of the district ?-I cannot remember having secouny of them.
- 22. Q. Are there any rice tanks ?-No; I think they grow vegetables.
- 23. Q. (The President)—The Muchkundi tank has been a great failure !-- Yrs ; I think so.
- 24. Q. You recommend that the large tanks in Sangeri and Hatlar should be completed ?- Yes, I think so; as we have spent so much on them.
- 25. Q. Are they preity well advanced?—The Sangogi is well advanced, the other not so far.
- 26. Q. Noue of the saperstructures have been completed?-No; none at all.
- 27 Q. The capacity of the tank will be 2,845 million on bic feet?—Yes.
- 28. Q. You say more liberal takavi advances might be given provided that the work is carefully watched and the whole advance is not made at once ?—Yes, but I would spread the re-payment over a longer time. I would show a good deal of liberality.
  - 29. Q. What is the present period?-Ten years.
- 30. Q. You bave provision to allow more in the Code?-
- 31. Q. (Alr. Muir-Mackenzie)—You cannot exceed 20 years without the sanction of Government ?—No.
- 32. Q (The President)—We find that every where the full period is not allowed?—I think that 10 years are usually granted.
- 33. Q. Do you think 20 years long enough?—Yes, except in some places where it may be raised to 25 years.
- 34. Q. (Mr Higham)-Could you give 20 years now? Inm not sure.
- 35. Q. (The President)—You say "last year there were 132 more irrigation wells dug in the district than five years previously?"—I got that from the returns.
- 36. Q. Of kachcha wells nearly 400 remained disused? Were they not deep enough?—I think they were silted up.
- 27. Q. The high rates obtained last year for erop produce ought to make them exert themselves the more to work their wells?—Yes, those who used them found themselves benefited.
- 38. Q. Is the aren under well irrigation falling off P-I should not have thought so.
  - 30. Q. Have you the figures?-No.
- 40. Q. I think the high rate created a very great inducement to increase well irrigation?—Yes; I think so.
- 41. Q. In this district there are very few wells com-pared with others? It is a very small number indeed.
- 42. Q. (Mr. Higham)—You say irrigation is not resorted to under the Muchkundi tank by the people; why is that?— I think they are afraid water will not last if they commence to take it for percunial crops.
- 43. Q. I see from one of the statements, propared by you that there is invariably some water left?—I should say they do not care about it; they prefer the ordinary dry
- 44. Q. Would not that upply to any new tank that might be made?—Yes; I think, it will deduct from its paying capacity cortainly.
- 45. Q. Is the water-rate you charge too high P-No; I think the ordinary rate is Rs. 2. I do not think it is too much. I do not think that lewering would induce many more people to take it.

there are a few.

2 P 2

Mr. W. W. Drew,

- 46. Q. Oo second class warks of which the management is left to the cacple, do they take water every year?—Yes, because they have to poy whether they take it or not.
- 47. Q. Do you think it is possible to put such works os the Muchkundi tank on the sume basis?—I do not think wo could do that under the present law.
- 48. Q. Is the tank a paying one?—Nuthing like it; it does not poy the expanses.
- 40. Q. Why not allow people to manage the Much-kundi tunk themselves !—I don't think they would keep it io good order.
- 50 Q. There canld not be much risk in making the experiment?—No.
- 51. Q. So far os your experisneo goes in this district the people are reluctant to toke the water !—Yes; thay certainly are.
- 52. Q. There is no reason to suppose it would be utherwise if you made new trucks?—I don't think it would unless a consolidated rate is pot un.
- 53. Q. At the next settlement or at once ?-I chould say of the next settlement.
- 54. Q. Would people like that or would they prefer to pry a water-rate?—I think if they had the chaice they would prefer a water-rate. They could then take water when they liked.
- 65. Q. Do you think irrigation tanks ore mure likely to be developed if you put on a consolidated rate?—Yes.
- 56. Q. (Mr. Ibbetson)—Do you think that the people refuse to take the water from the mere fact that they are not sure that the water-supply will last?—I think that io partly the reason.
- 57. Q. Do you think that is mainly the cause?—I think so; in time they will be accostumed to a tank supply.
- 58. Q. At present they get water from wells which last all the year round?—Yes, in bad years the tooks run dry.
- 50. Q. In ordinary years, in a year of average rainfall, have you any storage which water laste throughout the year basides wells ?—Yeo; I think the water of one canal laste through the year.
  - 60. Q. Up to June?—Yes; quite up to June.
- 61. Q. Do you know what the people grow mainly?—Vegetables.
  - 62. Q. High-class crop f-Yes.
- 63. Q. Do they use the unter every year in ordinary years i-Yes.
- 61. Q. Under wells in ordinary years do they water dry crops at oll?—I am afraid, I don't know.
  - 65. Q. In famioo years they do so ?-Yeo; a great deal.
- 66. Q. You say a great number of wolls lie disused?—
- 67. Q. If n man has laid unt his capital in preparing the land for cultivation of high class crops, do you think he allows his wall to go out of use?—I think his descendants don't use it.
- 68. Q. Could you say from your observations during thase past two years how far well-irrigation prevented people from going an relief works?—It did so to a very large extent indeed.
- 69. Q. Have you noticed a marked difference between the villages whose well-irrigatian exists and those where it does not 9-Xes; a great deal of difference.
- 70. Q. Does that apply to villages under tanks?—No, there was hardly ony water in the tanks.
- 71. Q. It is mainly in the villages noder wells?—Yes; the water in wells near tanks lasted for o long time.
- 72. Q. Da yoo think that in any villages or villages that you know of there was sa much protection from wells that they did not seed any hody on rehef works?—I think so.
- 73. Q. Could you give us any idea at all of what proportion of the cultivable, area was irrigated by wells in these villages roughly?—I chould not thick more than one-tenth.
  - 74. Q. Not more than that !- No.
- 7āQ. . So for os your experience goes if n village has that proportion of its area irrigated by wells it would have sufficient protection against famino?—Yes; but I could not be quito ours.

- 76. Q. If a village had a quarter of its area irrigated by wells you would regard it as safe?—Yes, certainly.
- 77. Q. Would you be icalined to put it at occ-eighth?
  -Yes.
- 78. Q. Speaking of those other Gavorument works on which a cansolidated rats is paid, are thora any large works among them—I mean works under which 2 or 3 villages irrigated ?—I think under the Mandopor two villages are irrigated.
  - 70. Q. Do they manage their owo distribution ?-Yes.
- 80. Q. We were told that people cannot combine in these parts so as to orrange their owe distribution?—I think they can.
  - 81. Q. Your experience leads you to think so?-Yes.
- 82. Q. What has been the history of your wells deriog these past 2 years? You had famina in 1806-97 and then 1 heliore, you had a year of good rain full?—Yee, hut, I bellsve, that some of the villages have not had raie for 5 years.
- 83. Q. In 1899 whoo the second famine came, how did the wells should Hed they had a fell sopply ?—I think so.
- 84. Q Since then, I suppose, they bave more or less failed?—Yes.
- Sa. Q. When did they begin to fail?-About Jonuary 1900.
- 86. Q. As early as that?—Yes; we began to feel the pinch for water from January 1900.
- 87. Q. From that time things became werse?—Yes,, 88. Q. What propartion of their normal eros, do you soppose, the wells could water new?—I should thick obout one-half.
  - 80. Q. Not more than half?-No.
- 90. Q. The locrease in area of lands irrigated was due to well-, which were partly discosed, being brought into use again?—Yes; I think so.
- 91. Q. As regards taken you recommend that, when water is not found owing to causes which are not under the control of man, the muncy should be remitted?—Yes,
- 92. Q. Would that be advisable; would it not give an opening for fraud? We have been told by witcess after witness that it would be inadvisable in Bombay; a man would take its, 500 to make a well and opend only its, 200 on it, applying tha rest to his own use and then say "I cannot find water and I must ha let off." What do you think?—I den't believe that to be possible as long as we have supervision. If we have an establishment to supervise these works I don't see haw that could be the case. Yno can see if he has dug n hole and you can find ant how anneh it has cost.
- 93. Q. Do you think that the sepervision at present available would be sofficient?—It is a question how large your establishment is.
- 94. Q. In n year like the one you have lately experienced, opplications for takeri ore more enmerces than in ordinary years !—Yes.
- 95. Q. In soch o year hot not in an ordinary year you woold want an oxtro staff.—Yes.
- 96. Q. Where the sobordinate officers have to make reports as to the yield of crops or areas, or any matter in which Government and the aultivator or concerned, is it your experience that their tendency is to oversiate or understate the fact, to lean slightly thwords the Government side or the reverse?—I do not believe that the subardinate village officers lean to Govaroment,—probably the Ahamlatdur dags.
- 97. Q. The agency in their report would of ony rate not be likely to report that something more has been spont than has resily been tha case. Suppose a man has borrowed R-500 snd spent only Rs. 400, in their report what would the Manulatdars say—What is your experience?—The Manulatdars would be on the Government side.
- 98. Q. There would not be very much danger of Government losing maney to the way I have indicated;—No, I doe't think so.
- 99. Q. Have you any experience of boriog apparatus?
  -No, none ot ell.
- 100. Q. A cansiderable number of wells were made during the famine years of 1800-17, are most of them kackeka?—I could not tell the proportion but I have seen both kacheha and pakka.

- 101. Q. What is your impression? Are there as many kacheha as pakka?—The people generally got money and make them pakka.
  - 102. Q. Are there a good may kacheha wells?-Yee.
- · 103. Q. A great many.-Yes.
- 104. Q. Would it be worthwhile making efforts to get these made pakka?—Suppose you were to offer them additional takavi grants on easy terms, do you think that the people would be induced to make them pakka?—Yes; a good many have been made pakka.
- 105. Q. Do you think it would be a great inducement if you could tell the people that you would take no interest?

  —I don't think that would make very much difference. I den't think the people mind paying the interest.
- 106. Q. If you were prepared to advance money on ordinary terms do you think they would take it.—Yee, I think so.
- 107. Q. In regard to grants for welle have you over had complaints about the amount granted not being enough to make a well ?—Yes, I have.
- 108. Q. Is the insufficiency of the grant due to the fact that the land is perhaps hardly sufficient security?—I think it is partly due to that. Then the Mamlatdars, as they are responsible, are very cantions.
- 109. Q. Apart from that is it your experience that in many parts of India there is a feeling that takavi is a sort of dobt of honour which must be repaid?—No.
- 110. Q. You don't think that that is the feeling ?-I have nover heard of it.
- 111. Q. (Mr. Higham)—Is it regarded as a discreditable thing to take takavi?—Not at all.
- 112. Q. (Mr. Ibbetson)—You say "it seems to me that it is the hest soils that require the deepest wells" you are speaking from experience?—I think so; of course, I do not know very much of the question of digging wells in black soil. I think it is the most difficult soil to get a well in well in.
- 113. Q. It pays best when a well is deeper?-Yes, but in very many places you cannot get water.
- 114. Q. You are distinctly of opinion that there are a considerable number of wells that have been made that are etill efficient and are not used in good years in this district ? -Yes; 1 think so.
- 115. Q. (The President)—Are they not not used for want of cattle?—No; it was not worth the labour.
- 116. Q. (Mr. Rajaratna Malr.)—On the Muchkundi Tank the average area irrigated is 43 acres and assessment Rs. 344?—Yes.
- 117. Q. That gives an average about of Rs. 8 per aero ? Tes.
- 118. Q. Do not you think that a high rate considering the uncertainty of the water-supply?—Perhaps it is.
- 119. Q. (Mr. Muir-Mackenzie) The rale, I suppose, depends upon the crop?—Yes; I believe it is its. 8 ou some crops and its. 2 le its. 4 on others.
- 120. Q. (Mr. Rajaratna Mdtr.) From Mr. Lawrence's table it seems that the unaber of wells has increased from 3,787 in 1886.87 to 7,185 in 1890.97. Has there been a further increase since 1890.97 P—Yos; I think so.
- 121. Q. Could you give the approximate number new existing !—I am afraid I have not got figures with mc.
- 122. Q. In one of the memoranda submitted by a Mamlatder it is stated that the amount of takevi is generally fixed at 20 times the assessment. Is that a rule ?—There is no general rule laid down, but it is fixed on the amount we would pay if the laud was to be taken up.
- 123. Q. (The President)—De you use up all the money that Government allots for takavi?—Yes, we use up as much as we get and we generally ask for more.
- 124. Q. Would you get more if you asked for it?-think that, it depends u pou the Gevernment of Iudia.
- 125. Q. (Mr. Muir-Mackensie)—During the last famine was the Government of Judia very liberal !—Yes, as far as I know they were.
- 126. Q. (Mr. Rajaratna Malr.)—Have you any etatement showing the amount of takavi advanced in 1900-1601?-Yes.
- Mr. Muir-MacLonzie.-I think you will find it in Mr. Lawrence's hook.

- 127. Q. (Mr. Rajaratna Malr.)—Up to 1899 to 1900 five Mr. W. W. lakks of rapess were advanced for the con struction of wells.

  The figures for last year are not given ?—We advanced about 2 and 3 lakks, not altogether for wells.

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- 128. Q. Excluding last year, you advanced 5 lakhs of rupees during the previous ten years for wells alone?—Yes.
- 129. Q. Is the number constructed out of this known? -Yes, I can get the figure for you.
- 180. Q. Abent Rs. 50,000 were granted for other irrigation works. Is there anything known as to what these other irrigation works chiefly wers P—I suppose the making of small canals and hunds.
- 131. Q. Is any information available es to the number of wells not completed owing to the insufficiency of takavi advances ?—I cannot say; I shall ascertain if the figures are available.
- 182. Q. Would it not be advisable to give enough money to enable the people to complete the weils?—Ycs, I think it would be advisable.
- 133. Q. You sey "three lakks collected were due to the Revenue Code Amendment Bill "?—When the Land Revenue Bill was first introduced the people did not understand its object or its effects, and consequently during the first week or two after it first appeared in the papers the people rushed to pay. If they had known that rovenue had been suspended that would be a partied to pay. If they had known t pended they would have wnited.
  - 134. Q. They paid up the arrears?-Yes.
- 135. Q. (Mr. Muir-Mackenzie)—What proportion of the district do you think it would be necessary to thoroughly afforced in order to make that plan afford some approximal protection to the district f—I could not say.
- 135. Q. Do you think it would be one-third !- I could not say.
- 197. Q. About one-fifth !- Yes that would be more like
- 138. Q. Do you not think the scheme might be outside the rauge of practical polities P—Perhaps it might be.
- 139. Q. Do you think that the power to withstand drought would be increased by increasing the number of tale?—I don't think that tale are of much use in a bad year. They might increase the fodder crop.
- 140. Q. I thought I noticed that there was a difference on the line of milway in these fields which have bunds?—They might improve the fedder even in a bad year; but they would probably meke only a little difference in a grain
- 141. Q. De you coasider fourteen or fifteen years without famiac the normal period for this district?—No. It was
- 142. Q. On what grounds ?—From provious experience; I doo't think we over had 10 years without familie or without severe distress: 1890-1891 was a year of distress.
- 143. Q. In that year did Government collect all the land revenue?—I do not knew what they collected.
- 144. They did collect something. Do you remember how many people there were on relief in that year?—I cannot
- 145. Q. Assuming that Government collected most of the revenue in 1891 and 1892, I gather that after 1876 and up to 1901, Government lest about one year's land rovenne, in addition to the expenses incurred on famine relief P-Yes.
- 140. Q. Did the people reliaquish much laud?—No; because we suspended payment of assessment.
- 147. Q. Did you find people deserting the villages?—Yes. A great many went away, but most of them came back.
- 148. Q. The point of my question is, whether in 1877, a large number of people deserted and did not come back?—
  So I have heard.
  - 149. Q. And their lands were put into foreste?-Yes.
- 150. Q. What do you regard as about the cost of a well of average depth P-Between Rs. 500 and Rs. 1,000 for a pakka well.
- 161. Q. For an ordinary well !- Abent Rs. 600 to Re. 700.
- 152. Q. Would you be glad to see funinellabour omployed on hunds and tols?—I do not quite believe in the employment of famine labour on private persons' lands.

Mr. W. W.

- 158. Q. Do yan think that it wanld be difficult ?—I have not thought about it at all; I think it wanld be difficult to employ famine labour an private persons' lands. They could do the work cheaper themselves.
  - 154. Q. But, suppose they were not charged, and Gavernment did it far nathing?—Then there would be no abjection. Perhaps the people would be auspicians at first; but they would get recouciled. The question would be the arganization of loboor.
  - 155. Q Do you see any difficulty about organization f— Wo would have ta treat a whole villogs et a time, so as to decreose the cast of enpervision.
  - 156. Q. Do you think my insaperable diffisulty would arise P-No.
  - 157. Q. On the whole, you are in fovour of thet sahems? I would rather have it than making more reade.
  - 158. Q. Would you rather employ fomius lobour on tals thon an tanks?—No; I would rather employ it an tanks.
  - 159. Q. Was any praposal made ta employ famine labour mu these bunds?—No; not in this district. It was done in the Jath State but without ony great success. The present Administrator dase not boliave it; he thinke that the cost is out of all preportions to the profit.

- 160. Q. The last Administrator thought be might employ famine labour more esecomically within the State?—Yes.
- 161. Q. Resides the second class works are there any small irrigation works in your district P-Yes.
- 162. Q. Would yau like to see their number increased? —I don't thick that would do much good; I thick if mare money were sunk in wello it would be more profitable.
- 163. Q. If the existing tanks were improved or new tanks constructed do you think that the people wantd use the water?—I do not think they woold in ordinary years.
- 164. Q. On those worke on which they use water do you bink they use it economically?—I think so; I have not beard of any disputes or complaints.
- 165. Q. You have never heard complaints af the water being wasted?—No; I have not.

  166. Q. (Mr. Ibbetson)—Do you think that people are prevented from laying out money in irrigation works by the fear of increased assessment?—I don't think the people know that improvements cannot be taxed.
- 167. Q. One of your own Memlatars was not quite cure about it?—Yes; the people da not know, or well or thay ought to, that improvements on lands will not result in an increase of assessmoot at the next revision of settlement.

WITHESS No. 68 .- Mn. RAGHAYENDEA SHAMRAO BAITMANGALKAB, District Deputy Collector, Bijapur. Answers to printed questions.

Mr. Point No. 2.—The grass area of the Bijápur district in Baitmangal- acres for the year 1900-1901 is 8,628,789. kar. The oulturable area of the district is 3,227,208 acres.

Area irrigated in 19,428 acres. In 'round figures this comes to about 20,000 acres. 6 Jon. 02.

The different cources from which water-supply is secured ta thio area are as follows :-

		Acres.
(1) Government Irrigation works		1,440
(2) By private or village works		2,202
(3) By wolle	•	15,786

The proportion of area irrigated by Government works of the total culturable area is 1 to 160, i.e., '060 per cent; that of area irrigated by private or village works is '0889 per cent; that irrigated by wells is '49375 per cent.

The nature of the country is undulating and consists af varieties of the soil as shawn below:—

					ĸ.	a.	р.	
Totally red soil .	•	•	•		0	õ	4	
Totally black soil		•	•	•	0	5	4	
Mixture of black a	nd rec	soil	togeth	er.	0	5	4	

i.c., a third of the total area may be assigned to each of the three above-mentioned olasses.

The statistics relating to rainfall are as chawn below :-

						Inobes.	conte.	
1895	•		•	•	٠.	20	67	
1896		•				9	24	
1897				•		21	61	
1898						26	32	
1899		•				22	17	
1900				•		20	88	
1901	_		_		_	16	4.4	

There is ardinarily a demand for water in the districte of Bijapar and Duarwar during the south-west moneson for the reason that the two tracts are not tatelly robi cropgrowing districts. In Bijapar the whole of Bádámi, more than three-fourths at Hungond and Bágalkot are tracts adapted for kharif juari. Portione of Muddebihal, Sindgi and the whole of Bágevádi, i.e., the portion going by the name of Don valley, may be seid to be not in need of water during the south-west is monsoon, as the soil thereof is more adapted for the growth of late crops, such as late juari, gram, wheat, etc., so well as cotton. The ather portions of the district ore suiled for the raising of kharif crops. It is for this reason that there exists a demand for water in the months of June, July and the carly part of August. In the asso of Dhurwar I must say that the whole of the district, except Navalgand and ports of Ron and Gadog There is ardinarily a demand for water in the districte of

excluding Mundargi, needs waler during the coultb-west monsoon. Early juari is the principal stople raised in this district in the non-mailed portions of Dharwar, Huhli and Bankapur. The whole of Hangal, Kalghatgi and Kad, where early rice is the principal staple grown, rain is essentially necessary during the sooth-west monsoon.

The following is a liet of the crops which require irriga-tion both in the districts of Bijapur and Dharwar, with the exception that ie the first-mentioned district cocca palm and enpari (betel-nuts) are not raised in its gordens, while in the malled gardens at the last-mentioned district that two above mallad gardens at the last-mentioned according garden crops are raised for the most part :-
Duration for obtaining

						Data	mal	ior ot urity.	ainig
	Onions	•	•		•		3 1	nont	hs
2.	Coriander :	seed		,		•	2	9)	
3.	Khopuli o	r joda	palm		•	•	4	,,	•
4.	Carrots	•		•		.7	4	<b>b</b> )	
	Sweet pota	toes			• •	٠.5	19	,,	
	Chillies				,	•	4	,,	
7.	Plantaino	•	•	•	•	.7	12	"	
8.	Sngarcano			,	,	. 5	10	"	
	Maizo				•	•	3	9)	
10.	Fadder jul	រោ			•		3	"	
11.	Brinjals at	ad otb	or ve	zetah	leo	•	2	**	
12	Rále .	•	•		•		3	22	

All these crops require ordinarily two waterings in a week in the district of Buapar. In the case of superior week in the district of Bijapin. In the case of superior soils which could retain moisture, one watering is said to be enough in a week. In this respect the cose of Dharwar differs to some extent fram that of Bijapor. In Dharwar, especially in the treet which lies to the west of the Poana-Harihar Road, some of the garden crops, such as onions, carrots, chillies oud meize, are roised during the south-west monsaon without irrigation.

Of these, onious, garlie, sweet potatoes, faddor jnári, brinjals, etc., nre sown in Bijápar, after Diváli, i c., in the cold wenther. The rest are sown in the commencement of Mriga Sál, i.o., early in June.

The distribution af water in the case of Government Irrigotion works is controlled by the officers and subordinates of the Irrigation Department both in the districts of Bijápur and Dhárwár. Distribution fram Government tanko in both the districts nod from wells which are for the most part private property does not need any control, for the reason that in the case of irrigation fram private wells the nrea irrigated is, as a rule, the property of an individual, and as such, does not need the necessity of control. In the case of tank-irrigation also the fact that a larger proportion of lands dependent an that kind of irrigation bas been assessed at consolidated rates has minimised the necessity of control in water distribution. The villagers amongst themselves choose a rayat and cutrust him with the doty of water distribution. He is called the "Nirmanegár." He is paid geaerally in kind by the royats holding lands nader the particular tank. It is this "Nirmanegár" wha distri-The distribution of water in the case of Government

botes water to the villags lands in the order of retation according to custom. The instances in which the rayats land to invoke the assistance of authorities by a soit in the Mambadar's Court under Act No. III of 1876 for the removed of obstruction caused to the flow of water for the irrigation of their lands were so few in the interval of cearly 15 years, during which I held the office of Mamlat in the districts of Bijapur, Dharwar and Kanora, that I am prepared to say that the existing arrangements call for no cause of interforence. Irrigation revenue is realized In the forms of distinct water rate and coosalidated assessment in the two districts. The first-montioned form of realization is only adopted in the cass of recent irrigation works as shown bolow :-

Bijápur Muebkundi tank. 1. Madag canal. 2. Dambal tank. Dharwar .. 3. Medleri tank.
4. Asundi tank.

In the case of all the other irrigation works consolidated ascessment is levied.

The extent to which coltivation is dependent on artificial irrigation bos already been stated above. On the whole the area so irrigated does not exceed '060 per cent. of the total lituroble area of the district of Bijapur. The statistics of Dharwai ore not available with me.

Point No. 1.—Ont of 17 Government irrigation works which stand registored in public occounts in Bijápur, 5 are streams or nales wherefrom water is made available for irrigation. The rest are tanks as shown in the accompanying Statement B. In the case of Dhárwár I am sorry I was unable to collect the necessary statistics, having had to sover my connection with the district just at the time when I was called upon to answer these queries for the information of the Irrigation Commission. However, I take this opportunity of placing at the disposal of the Honorable Commission such information as I possess on the subject. As a Sub-Divisional Officer in charge of the four southern As a Sub-Divisional Officer in charge of the four southern As a Sub-invisional Gueer in charge of the lour southern talukas of Dhárwar I had reason to see two canal works and a certain number of village tanks, all being Government irrigation work. The two canal works are (1) the Madag and (2) Dharma canols. The first-mentioned work is a diversion of the floods of the Kumadwati River which reasons in clarge lake called Madag tank. The tank proper rises in a large lake called Madag tank. The tank proper is situated in the limits of the Mysere Province. This is an enciont irrigation work, said to hove been constructed n fow hundred yoars ago by the former raiers of the land and appears to have been abandoned at the time of the introduction of the British rule. It has been restored to its former use nearly half a contury ago after the advent of British Power. Two canals have been constructed and they irrigate lands of about seven villages in the Kod Taluka. The other principal work goes by the name of Dharma canal. This is a diversion of the floods of the Dharma River in the Hangal Taluka. Water has been diverted into the canal at two different places by throwing stone embankments across the bed of the stream. These two diversions or eanals irrigate the rice and bagait hads of about 28 villages. All the other Government irrigation works foll within the category, of village tanks. Both the Dharma canal and the unsporting of tanks are ancient works and are now under the management of Dhurwar Irrigation Department. Except Modag tank or Madag canal all the other tank works proved a

failure in the year of scanty roinfall of 1899-1900. I cannot say that Dharma canal proved to be a total failure. In Baitmang it the years of avorage rainfoll the irrigators used to get three waterings, but in 1899-1900 many villages did not even get one watering. In many cases the outturn of crop raised by irrigation went down as low as two to three annas in the rupee. The capacities of Asundi and Melleri in Ranebennur Taluka have been recently increased by the Irrigation learnerings. Department.

Regarding the range of variation I have to add that there ore, under inightion in the case of each particular work alluded to above, the areas likely to fluctuate or vary according to the quantity of supply available in them. This again depends upon the rainfull of the year. In the year of ample fall the area under irrigation does not show a folling off, whereas in a year of seasity fall there happens to be a corresponding diminution in the area irrigated.

Point No. 6 .- By district or villoge works I understand Point No. 6.—By district or village works I understand that they are meant to designate the works constructed at the cost of District or Taluka Local Board funds for irrigation purposes. So far as I am aware, no such works do exist either to the district of Bijapur or in Dharwar. The resources of these local bodies are not, in my opinion, sufficient to undertake such works. In their present financial strain they cannot be expected to go beyond the objects provided for in Bombay Act No. I of 1884. In these circumstances I am not prepared to suggest the execution of soch works by the local bodies.

Point No. 7.—Total area irrigated by wells in ordinory years in Bijapur is about 10,000 acres. Number of new wells constructed during the last 10 years is about 2,700. Information is not available as to the number constructed annually. The accompanying statement, marked A, shows the extent to which taker advances have been made for the construction of wells in Bijfipur during the last 10 years. So far as I am aware, no concessions have been given to the constructors of new wells. In my opinion it is desirable to constructors of new weets. An my opinion to is desirable to stimulate the construction of new wells by more liberal advances. Owing to scanty rainfall in 1899-1900 the wells in the districts of Bijapur and Dharwar had run dry in almost every case in the following year. In cases in which betel vine irrigation solely depended upon well-supply the owners of the gardens had to deepen the surface or olear silt and to the rule of their errors supplied. In the case of the surface or olear silt and their proper supplied. in order to make their crops survive. In the case of wells in gardees, which depended upon tank-supply, the wells had miscrably run dry, and the superi crop had to suffer serious damage in Dharwar. I had to notice this in Hangal parli-oularly. The people had to cut down a large number of supart trees and ose the dead wood in putting up their plague sheds. In the case of the wells which had the sub-soil drainage or percolation supply from tanks the average depth of water below surface was found to reach from 15 to 20 feet or thereabouts. In the case of other wells the depth was observed to reach from 30 to 50 feet. The cost of un average well for irrigation much depends upon the nature of soil to be excavated and the distance at which the water-bearing strata would reach. Generally wells dug beside the malas and rivers cost less than those dang in black soils. The cost of a well falling within the foreign class comes to about Rs. 200 to Rs. 250. In the case of other wells the outlay may be estimated to cost about Rs. 500 to Rs. 1,000. The oven served by an ordinary well may be estimated at about 15 acres or thereabouts.

(A)—Statement showing takavi advances given for the construction and repairs of wells, tanks and other sources of irrigation and improvement of lands in Bijapur District from 1890-1891 to 1899-1900.

					Total advances		FOR IRRIGATE	ly ruprobes.		For
	¥ear,				under Land Improvement Act.	Wells,	Tauks.	Other sources.	Total.	improvemen of land.
					Rs.	Rg.	Rs.	Rs,	Ra.	Ra.
1890-1891	•	•	•	•	2,200	1,200	100		1,200	1,030
1891-1693	•	•	•	•	2,24,791	76,787	200	47,497	1,24,484	1,00,80
1892-1893	•	•			14,802	8,222	1,700	1 1	4,929	9,88
1893-1894					51,485	8,290	•••	l l	3,200	48,10
1894-1895					1,25,050	15,000	•••		15,630	1,10,32
1895-1896					97,020	7,775	***		7.775	89.24
1896-1897			·		9,18,625	3,51,670	***	1,220	3,52,890	5,65.73
1897-1898			,.	•	19,330	4,675		1 1	4,875	14.05
1898-1899	-	•		•	92,567		***		6,920	25.64
1899-1900	•	•	:	•	1,46,115	0,920. 41,750	*** ,	•••	41,750	1,04,30

(B)-Statement of consolidated revenue from Irrigation Works for the year 1900-1901-Canal Return No. VIII.

Mr. Baitmangal kar.
6 Jan. 02.

		HED C	KD	ibes Butub Mert.	ASEA VATS: TILE	ום כ	DENG	01	en Pr		ME	E AR	ADE	ted assess-	,		DAVE DEED	n den ou de La den ou de La den ou de ou de	AND THE
No.	Nams of work,	Kbarif.	Rabl,	Total	Kharlf,	Rabi.	Total,	Kbarif.	Rabl.	Total.	Kharif,	Rabl.	Total.	Not consolidated assu- ment during the year.	Irrigation share.	Land engre.	LATED. Impormatic Ermurat	on added as Breoletica March 1894	PER Gav-
1	2	3	4	6	-0	7	8	9	10	11	13	13	14	16	10	17	Astersment on luna and.	Judi.	Nais.
1	Momdapur Jagod ,  Maramkeri "Doddadu".  Do. "Snnadu".	<b>G25</b>		625	625		625	3,630	-	3,630				2,630	2,905	725	Rs. A. P.	Rs. A. P. 401 13 7	
3	Kumatgi Delhi Khan Vizir Keri	55		55	55		55	151		151				151	121	30	******		••• ••
4	Strar " Dodokeri "	16		16	16	[-	16	69		69				69	56	13	*****	*****	*****
5	Banshunkari Honda	40	١.,	40	49	-	40	295		295				295	236	59	)	(A) 442 10 1	
6	Soruswati Nallah	82	۱.,	82	82	-	82	616		616		•••		616	493	123	589 0 0	232 TO 1	151 15
7	Nilgand Arkeri	3	ļļ	3	3		3	11		11				11	9	2	147444	*****	****
8	Timengar "Dodkeri" .	72	Ļ	72	72		72	172		172	<b></b>			172	138	31	28 8 0	980	19 D t
9	Do. "Sankeri" .	35	].	25	35	]	35	91		91				91	73	18	59 4 0	48 2 0	13 2
10	Parvatikeri	82		82	82		82	383		383				353	207	76	221 8 0	69 7 D	135 1
11	Do. Ganjikeri.	41		44	44	۱.,	41	136		136	***			138	109	27	55 8 D	14 2 11	41 5 1
12	Kendar Tank	256		256	256		256	1,436		1,436	***			1,436	1,149	287	768 8 D	762 6 3	66 1 9
13	Gowandki Hond	14	-	14	14	])	14	98		. 88	***	•••		88	79	19	49 D D	240	46 12 1
14	Cheelopar stream	19		19	19	····	19	66	١.	66	***	***	•••	86	53	13	580	123	4 5
15	Hire Upnal stream	17		17	17		17	35		36	•••			36	29	7	*****		*****
16	Konnur stream	30		30	30		80	73		73	***			73	59	14		******	,
17	Palthi stream	50	Ŀ	50	50		50	125		135	***		**	135	108	27		*****	*****
		1,440		1,410	1,440		1,410	7,398		7,393			-	7,393	5,921	1,473	3,187 6 0	1,712 8 1	1,483 7. 5

(A) Includes Its. 8-9-6 on occount of Judi in excess of the Berision Settlement.

#### II.

#### A.-GENTBAL.

The answers below refer to the districts of Bijápur and Dhárwár. As a Mámlatdar and a Sab-Divisional Officer I have hed a fair opportunity af becoming acquainted with these tracts.

2. The overage rainfall of Bijapur in an ordinary year of rainfall is as shown below:—

#### Bijapur (Taluka Bagalkot).

				I	nohes.	cents.	
1895					20	67	
1896	•				9	24	
1897					21	91	
1898		•	•	•	26	82	
1899	•	•	•		22	17	
1900	•	•	•	•	20	99	
1901					16	44	

I am sorry I caunot supply the information for the district of Dharwar as I was obliged to sever my connection with that district when I was required to answer to these queries owing to my transfer to Bijapur.

3. So far os I om oware, the under-mentioned ceuses may prove to be obstacles to the extension of irrigation in the above-mentioned tracts:—

(1) Pore black cotton soils of Navalgund and parts of Gadag and Ron in Dhármár.

(2) Parts of Hungund, Siodgi and Bagevadi in Bijapur with block cotten soil.

(3) Lack of capital for the initial expenditure, etc.

(4) Uncertainty of the supply of woter, etc.

With these exceptions, in the other portions of the two districts irrigation may possibly be extended if due provision for water be made. 4. So far as I can recollect, no orders appear to be in force which exempt land irrigated from works constructed by private capital from liability to the poyment of enhanced necessment for a certoin and epecified period. But in this connection I cannot refrain from quoting the liberal provisions made in the Bombay Land Revenue Cods, which prohibit the enhoncement of assessment accruing to the land from the improvements effected at the cost of private capital during the currency of a settlement, and I beg to take the opportunity of inviting the attention of the Honourable Commission to the orders of Government passed so for back as 1874 for the assessment of lend irrigable from wells constructed from private capitals. Therein the rate of fixing sessessment is restricted to the highest dry crop rate. That rate is Rs. 1-10-0 in Bagalkot, Rs. 1-8-0 in Badawi and Rs. 1-4-0 in Hongond and Rs. 1-2-0 in the rest of the talukas of the Bijapur District.

In Dharwar the maximum dry crop rate in some of the talukus of which I relinquished charge recently was Rs. 2-4-0 per acre, if I remember it rightly. I believe the rate in the neighbourhaod of Hubli and Dharwar must be far in excess of the above-mentioned rate.

far in excess of the above-mentioned rate.

So far as I nm awere, tennuts do not extend irrigation of their awar cost in the tracts alloded to above. The duty of moking extensions to irrigation generally devolves on the owner of the land. Tenants possess no proprietary title in the lend to be irrigated. Hence they do nut come forward to lay out their capital for the benefit of the landlard, who can, if he pleases, at any moment out them of their possescione. In my apinion the existing provisians are not quite sufficient to induce capitalist landlords to invest morn maney on irrigation in a tract where the assessment on dry crep lends is light nod where the nwner is sure to be profited by mising cotton and wheat crops without risk, expense and trouble in years of average rainfall.

5. The experience gained in the last few years has convinced me that the unlivetors of pure black cettan soil lands do not come forward to take tagai freely for the

sinking of welle. As has been observed above, the oultivators try to obtain as much tagái money as possible for the cradication of weeds and the construction of embankthe cradication of weede-and the construction of emback-ments, etc., to drain off flood water or to retain moieture. The existing rules as to the recovery of tagái leans une rather stringent and in my opinion deserve being made more clustic in practice. Unless Government are prepared to show to the borrower all the lenioney which a sewkar now shows to his debtor, I apprehend the tagái leans will not occume as popular as possible. When the question is considered in a financial pressure point of view I am of opinion that the plan will not prove workable. Of course the special concessions recommended in clauses I to 6 of the special concessions recommended in clauses I to 6 of this query may teed to the encouragement of tagai loane.

- 6. So far ae the two districts are concerned, extension of irrigation does not tend to jojure remaining coltivation. on prigntion does not tead to roture remaining contration. The staple crop is juari for the most part and the other valuable crop is cotton, which can be raised comparatively with less trouble and exponse than the irrigable crops; so the people would not take up irrigation to the detriment of the less troublesome cultivation.
- So far as the district of Bijapur and the non-mallad portion of Dharwar are concerned, people do not eviace any desire to extend irrigation to their lands for the abovemeationed reason.

For instance, the northern portion of Hirekerur and the conthero portion of Ranchesaur within a radius of 10 or 12 miles from Bysdgi would not willingly undertake irrigation instead of growing chillies as a dry crop; so the rayat holding black soil lands in the non-mallad portions of the Dharwar District and in the district of Bijapur would not prefer to resort to irrigation instead of raising early and late juari, wheat, gram, cotton, otc.

### C .- CANALS OF INTERMITTENT FLOW.

12. I' have not had any experience of caual irrigation in the Bijápur District. In the district of Dharwar I had come across the Dharwa and Madag cauals. Dharma canal is supplied with water during the raine by the floods of the Dharma River, while that of Madag is supplied with water of Kumadwati River. Two bands have been constructed to the Dharma River at two different places in two separate villages. The water of the main etream is diverted to the caual proper by throwing embankments across the rivers. Outlets built of etone musenry are constructed at reasonable intervals and the water is made to flow from the hod of the canal to the outlots through pipes or conduits and thence it is distributed to the fields by means of pats or channels. During the interval I had charge of the conthere cub division of Dharwar I did not receive any complaint from the villagers Dharwar I did not receive any complaint from the villagers who depended upon the Madag canal regarding the inude-quacy of supply. In the year 1899-1900, which proved most unfavourable even to the mullad tracts, the supply in the Madag canal did not fail, and the distribution was carefully controlled and regulated by the officers of the Irrigation Department, and the helders of lands which depended upon bopartment, and the dieders of raising where the area water for irrigation had the good lues of raising two crops. It was quite the reverse in the case of Dharan canal. The bed of this canal ordinarily gets dry at the end of January or thereabouts. In 1899 and 1903 the canal bed rau dry or thereabouts. In 1899 and 1903 the canal bed rail dry as early as October when waterings were necessary for etnoding rice. There were conetant complainte from the villagors who depended upon this capply that the distribution was unequal and that underhand dealings were also attributed to the subordinates of the Irrigation Department on whom the responsibility of distribution lay. In the case of this canal as second crop is raised by irrigation except pulses arised in rice lands at becoment to the autiliar of rice while eansi so second erop is raised by irrigation except pulses raised in rice lands subsequent to the outling of rice while no watering is necessary. In the onso of Madag it is supposed that a perennial supply is maintained in the year of ample rainfall. Is that of Dharma the cupply does not last beyond the menth of Jannary, i.e., till the close of the kharif harvest. In the year of scanty rainfall the experience of 1899-1900 proved that the canal had ran dry as early as Octubes when the kharif including raddy waterly as Ortuber, when the kharif, including paddy, wanted water very badly. I have not had an opportunity of trying these two canals in a year of drought. It is for this reason that I have obsseed Madag canal under class 'C' of intermittent flow and not under class 'B' of continuous flow.

14. So far as the rice grown in the mallad tracts of Dharwar is concerned; too late a commencement and too early a cessation of the copply are considered to he prejndicial to the growth of the crop. It is a general idea that howseever a good supply of water were maintained in a cunal, still rice crop is not supposed to yield a bumper outturn unless the paddy when in care does not benefit itself

by the late rains of October—what are locally tormed the Mr. falls of Uttara and Hasta Nakshatras. Hence it is necessary Baitmangalthat rice should he sown as early as it would admit of being in ears in September to Ootoher. Any ceesation of late rains is sure to bring about a failure of crops. The harvest of 1889-1900 of Hangal and Kod talekas is a clear evidence of my above assertion. I have not had the opportunity of observing the effects of too late a commencement of irriga-

15. I have not as yot come across any canal irrigation which was sopplousented by irrigation from wells given to the same land. I cannot therefore satisfactorily answer the same laod. this question.

#### D.-TARES.

- 23. (1) The tanks in the villages' traversed by the Dharma canal receive their supply from the canal. Other tanks is Hangal and Kod tanks receive their supplies from monsoon floods which drain the neighbouring aplands. The Bijapur tanks receive their supply from monsoon floods.
- (2) Water is distributed to the land by means of sloices or outlets constructed at convenient centres in the dam through pipes or masoury channels, water eventually reaching the irrigable lands by pats or channels.
- (3) The samply is ordinarily maintained throughout the year, i.e., till it is replenished by the storm or measons should of the following year in a year of ample rainfall so as incode of the following year in a year of ample rainfalt so as to suffice for the irrigation of segarcane, cocca palm, betol vine and supari palms. In a year of seasily rainfall the supply heally meets the requirements for the growth of paddy. In the majority of cases the beds run, dry in a year of scanty minfall. Then it is out of question to expect that they chould retain their sapply is a year of drought. The tank of Hirekerur is a typical icetance of tanks having run dry in the years 1804—1901. In these ways are the tank bads were given out for the maising of two years the tank bods were given out for the raising of autumu crops inasmuch as they had run dry.
- (4) The area irrigated from a tank depende upon its capacity to hold water. A line has been drawn by the Dharwar Irrigation Department by which it has under-Dharwar Irrigation Department by which it has under-token the management of tanks which irrigate an area over and above 50 acres. The management of tanks irrigating less than the above standard is left to the owners of lands benefited by them. As for the areas irrigable by the Bijapur tanks, particulars will be found in the accompany-ing statement. ing statement.
- 24. So far as the tanks of Dharwar are concerned, the aupply available therein is not utilized in cultivating two harvests even in years of ample rainfall. I think this must harvests even in years of ample raiafall. I think this must be due to the apprehension that the supply would prove insufficient for the perennial crops such as sugareane, botel viaes, eccea palm, sapari, etc., which require watering throughout the year and which depend upon the tank sapply. Ordinarily after rice cutting fields which are capable of retnining moisture are sown with the second crop of pulses, such so gram, mog and udid. These crops do not require watering. They grow by the sub-sell moisture and that hrought on by the dews of cold weather. In years of ecenty raiofall such as that of 1899-1900 and 1900-1901, the value of the produce of land under irrigation did certhe value of the produce of land under irrigation did eer-tainly increase, but I think it was due more to the prevailing high prices rather than to the fact of irrigation. When ang aigh prices rather than to the rues of irrigation. When the supply is available all round the year valuable crops, such as plantains, sugarcanc, cocoa and supari, are raised. In years of scauly fall these crops enfier.

In the case of irrigable crops years of scanty rainfall bring about more profit, dae to the limited sumply fetching high prices.

- 25. The roply given to question No. 14 holds good to this query.
- 26. So far as I am aware, tank irrigation ordinarily neede 26. So far as I am aware, tank irrigation ordinarily needs being supplemented by irrigation from wells given to the same land. This is especially necessary in the exce of sugarcane, hetel vine, ctc., during the hot weather menths when the supply available in the tank begins to run chort. This is only possible in a year of ample rainfall. In a year of seanty rainfall when the tank bede had run dry the crop raised therein land to saffer to a material extent. I have land to charge and damning done to the apparatuse and sense: to observe such damage done to the engarcane and supari crops in the villages of Hangal and Hattimattue in the Dharwar District in the year 1899-1900. Generally the supply in the Dhárwár irrigation wells which are sunk in the gardens commanded by irrigation tanks is co-existent with the tank supply.

kar. 6 Jan. 02. Mr. Heace in a year of scanty rainfall or in that of drought Bailmangal- the wells cannot be depended upon the supply irrigation to the garden crops.

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28. In the northern portion of Bijapur Dietrick the 28. In the northern portion of Bijapur Dietrict the rect neually paid by the cultivators to the owner of the lond is a fourth part of the produce. The liability of paying lead revenue devslves an the awner. Na private canals do exist in the two above-mentioned districts; hence no payment has to be made on this eccount in these districts. Generally the rats of rent for irrigated lands is less than that prevailing for dry exop land. The reason for this is obvious. Irrigation, in whatever form it is practised, is more expensive than the raising of non-irrigabloomaps. The only axception to this rule, so far as I have abserved, is in the case af mullad gardees, where valanthe crops, such as anpari, betal vine and come are rented. In these cases, though the initial east is henvy, their np-keep is not said to cost much. In these cases the rent moy go up to one-holf of the annual produce, the liability to payment af land revenue devolving always apan the owner.

In the case of irrigated lands in the Bijapur District

In the case of irrigated lands in the Bijapur District the maximum rate is as follows :-

Tálukas,					Rice rate. Rs.	Garden rat Rs.
Sindgi		•			. 4	5
Indi					. 4	5
Bijápar	٠		•		. 8	8
Bagevadi	•		•	•	. 4	8
Muddehih	ál	•	•	•	. 4	5
Bágalkot	•	•	•	•	. 8	***
Hungand	4	•	•	•	. 8	8 8
Bádásoi	•	•	•	•	. 8	8

29. The newer to this queetion mach depends apon the distance from which water is to be taken. Exponditure necessory to bring water to the field is not a heavy item on the occupant. For preparing the land for irrigation a sum of Rs. 12 to Rs. 15 is said to be necessary; ploughing Re. 5 per sero; levelling Rs. 5; manuring Rs. 2 to Rs. 5; miscellargeon vil. miscellaneone, nil.

miscellaneoae, nil.

This is generally incurred by the tonant. The tenant recomps this expenditure by allowing the landlord as emaller share of the produce. Three-fourths of the outurn by way of compensation, etc., go to the tenant. In the northern portion of Bijapur capply of manner does not prove to be an item of heavy expenditure, insamach as the rayst is said to be capable af getting a cupply without payment. This is said to be doe to a large supply available without proportionate demand. In this part of the country monure is not given to ary crop lands as is the case in the three conthern talakas of Bijapur and throughout the district of Dharwar. Hence manare can be had in the narthera portion of Bijapur without much expense.

30. In the case of Government tanks irrigating mere

30. In the case of Government tanks irrigating more than 50 neres in each case minur repairs, such as the clearance of water channels and the filling in of cart rats caused to the dams due to cart troffic and the like, are supposed to be executed by the owners of lands benefited by tank arrigation. Practically these repairs are not proctually executed by the parties concerned.

The work is generally got done by the use af pressure brought to bear upon them through the egency af village and taluku afficials. The average cost does not exceed more than manas eight an noro in the ordinary cases of reputs. ann mans eight an norm in the ordinary cases of reputra-I do not remember af any instance of tatal neglect or refusal on the part of irrigators to excente these ropairs which by custom and asage they are required to do. For these reasons I do not advocate the necessity of any legislation is this direction.

31. There are no tanks constructed by private persons either to Bijapur or Dhawar. As stated in paragraph obove, the management of tonks irrigating an orea less than 50 mere vests in the villagers. It is supposed that thoy should excente the necessary repairs at their own cost, but practically repairs are not exemted and the beds become gradually silted. Urgent repairs to antite aud chaonels are executed by the villagers.

The lands under Dharwar and Bijapur irrigation tracts have as o rale been assessed at consolidated rates. Hence no difficulty prices in the realization of revenue. In case of dispute as to the use or rotation of flow of water to the fields, the existing law, Act No. III of 1876, provide amplo rousedy for getting immediate reduces. No further legislation is necessary in this connection.

32. Construction of further tsuks by private persons is not feasible either in Bijapur or in Dharwar Districts. I do not think it advisable to take any action in this

direction. As a rule all cultorable lands have niready been taken up by ravuts. Construction of a new tank will ent ill fresh acquisition which will not prove to he an easy job to the rayat.

#### E.-WELLS.

34. (1) The average depth of permanent wells in the Bijápur and southern tálnkus of Dhárwár comes to from 30 to 50 feet. In the case of wells sank in gardens which depend upon tank irrigation the average depth is not us low as those which do not depend upon that source. The depth of the wells fallion within the last-mentioced entegory ie from 10 to 20 feet from the surface,

(2) The majority of the wells in the two dietricte derive their sapply from springs. Supply from percolation is mostly confined to wells sonk on the banks of nalas, the percentage of which does not exceed 12 per cent. The supply generally fails in the hot weather, in years of sauty rainfall and in years of drought. In the years of average fall the sapply does not diminish.

(3) The cost of construction varies necording to the class of lend wherein excavation has to be made and the depth at which water-bearing etrata can be reached.

In the localities where the circumstances are favourable the cost at sinking no nverage well with masonry wall on one side together with a masonry platform and the provision of pulleys comes to about Rs. 500. If mayonry walls have to be bailt on all the four sides the cost woold preportienatoly increase to Rs. 1,000 to Rs. 2,000 according to the kind af stoor used If dressed stones ara made nee of, then the item of expenditure will increase. The wages of a stone mason in on ordinary year comes to about eight nanas a day.

- (4) A pakka well of the above-mentioned description needs no repairs. Only it needs silt clearance once in 15 years ar thereabouts.
- (5) Lift is the only mode in which water is generally drawn up for the parpose of irrigation.
- (6) The avorage area attached to and commanded by a well may not exceed 5 to 10 seres at the most.
- (7) No portion of the area cacable af being irrigated by a well is allow avoidable causes. well is allowed to lia waste in a year axcept for un-
- 35. It is no undispated fact that two harvests instead of one can be made on laads irrigable by a well, and the val of crop raised thereon must turn out in be double of what could be raised from it by the sowing of klarif crop.

The general iden is that the soil is not adapted for the growth af valuable gardes crops such as supari and occapalm, ele, in Bijápor and non-mallad portions of Dhárwar. Cultivation of vegetables does not add maca to the increased value of the produce of the land.

Sugarcane may add to the increased value of the produce, but ite cultivation is not extensively resorted to for the apparent reason that a valuable error sach as an excite cetten can be raised with comparatively little ontlay and less trouble as well as to the fact of apprehension that the supply of water would prove insufficient during het

Ghur is not ordinarily manafestared from sugarcane in Bijápar and the non-malled portions of Dhárwár. It is generally used for consamption in the form of juice extraoted from cane in its raw form. The same reason holds good for the valuable crop af betel vice, the cultivation af which is not much resorted to in the sardons of Bijápar and those of the non-malled tracts of Dhárwár. The unity instance of exception to this rula in the Bijápar District which I remember is that of Tolosbgod gardens wherein betel vine is raised

88. So far us I am aware, serious difficulties are likely to be encountered with in some cases in which well-sinking no oe enconnector with in some cases in which well-shiking prajects are intended to be taken up, though I am not prepared to say that they happen in almost every case of well construction. From the experience gained in this direction as a Vice-President and President of the Local Bestds, I am of opinion that some assistance by way of expert edelse ia desirable in this connection in order to obviate the loss that desirable in this connection in order to obviate the loss that woold atberwise happen in the horrower and the waste at public money lent by Government. Some instances of failure at well projects have been brought to light which were solely due to want of expert advice in the selection of sites for well-sinking. I do not mean by this that the necessary ngeacy is totally wanting in the district. Quacks are found everywhere whom the callivators ordinarily consult. In some ceses even astrologers too are concented.

As a rule the stock available is from uneducated closs, and as such, the advice given by them does not turn out as useful as that emanating from educated agonor, hence the necessity of expert advice which is of some material value.

In the construction I have not hed the experience of royats having encountered with difficulties. I om not aware of any instance in which assistance has been given either by of any instance in which assistance has been given either or Government or by the local budies in the construction of wells in the shape of expert advice, etc., The best practicable way for attaining this object would be to utilize the services of excessers and sub-oversoors attoched to the Local Boards in the irspection of sites before the commencement of sinking and excuration work; eccoudly, to relieve the horrower of his liability to pay for the cost of basing in all cases, in which the proposes have resulted in boring in all oases in which the projects have resulted in failures; thirdly, to increase the number of instalments of repayment of loans grauted for well-sinking; and foorthly, Baitmangalto reduces the rate of interest to 3½ per cent. or so. By
these concessions, I think an impetus would be given to more well-construction businsos.

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- 39. The proposal is not likely to meet with the approval of the general body of rayats, on the ground that cost to he incurred by the Government ogency would be enormous as compared with that executed by the rayat himself. Favourable concessions, such as remission of interest and the increase in the number of instalments of ropayment, may stimulate the borrowers to consent to Government constructing wells in their private property.
- 40. I do not recommend the introduction of temporary wells in the tracts to which the above remarks refer.
- 1. Q. (The President.)-You are District Deputy Collector of Bijapur!-Yes.
- 2. Q. How long have you held that post ?—In this district only 2 months.
- 3. Q. Refore that where were you?-I was in Dharwer.
- . 4. Q. How long ?-Neorly 2 years.
- 5. Q. Where did you get your previous experience?—
  I was Mamlatdor in this district for 4 years (1885 to 1888), having previously been Awal Kurkun. Then I was Momlatdar in the Konara District for 3 years, thereafter Mamlatdar and District Deputy Collector for about 10 years in the Dharnar District. I came back to Bijapor in November last.
- 6. Q. You say in parograph 5, "experience gained in the last few years has convinced me that the cultivators of mre black cotton soil lands do not come farward to take takeri freely for the sinking of wells."—Wells are not popular in the pure black cotton soil?-No; that is my experience.
  - 7. Q. That Is, in about one-third of the district !- Tes.
- S. Q. Is it the same proportion in Dharwar ?-Yes, except in the mulind tracts where red soil predominates,
- 9. Q. What would you recommend for the protection of those parts of the district which are not favourable for irrigation and are of black cotton soil?—I think canal irrigation would be the best thing; they can raise sugarcane in black cotton soil from canal water and also from wells.
- 10. Q. Not from wells?-No; there is some difficulty about the depth of the water in wells.
- 11. Q. We have evidence in this district from other people that in ordinary years they do not irrigate black cotion soil?—No; they raise cotton and other crops and get a moderate profit out of them; that is my experience.
- 12. Q. Do you approve of smoll village tanks. Do you think they are really useful to the country?—Yes, in the mailed or hully tracts and not in black soil tracts where these shall tanks will not prove useful for the raising of dry crops.
- 13. Q. (3fr. Ibbetson!-Did yan sny small tanks; could they be made useful?-I meaut small wells.
  - 14. Q. Kachcha wolls?-Yes.
- 15. Q. ('the President')—There are not very many wells in this district P.—There are some places in this district in which the depth of a well from the surface goes down more than 100 or 130 feet. There are villages which have come under my observation in which the Public Works Department have abandoned well-sinking.
- 16. Q. Why? Because after sinking shafts over 100 feet no water has been rouched.
- 17. Q. What kind of wells?—Wells for drinking water supply. Well-siaking is not possible throughout the district. On the banks of nalos and rivers it is possible,
- 18. Q. I gather in Dhurwar there are many small traks on the western side of the district ?-Yos.
- 19. Q. The country here is like the eastern part of Dhárwar ?- Yes.
- 20. Q. Are there many tanks in the cast part of Dharwar?-So far as I know, there is only one big irrigation tank.
- 21. Q. No small village tanks?-Yes, there are zome in the Obarwar District but none in Bijapur.

- 22. Q. With your experience of this district what do you think would be the best thing for Government to do to help people so that they should not suffer if another famine occurred?—I would recommend the sinking of wells—pakka and kachcha—in places where water could be got near the natas and causa irrigotion by the bunding up of the rivers Ghatpmbha, etc.
- 23. Q. But there are a great number of places where there are no nalas ?—It is possible to bund the river, and make canals that would give some protection.
- 24. Q. Are there no causls ?-There are none in Bijapur. There are 2 in Dharwar-one is called Madag canal and the other Dharma canol.
- 25. Q. That has not done much good?-I cannot say that the carells have done no good. On the contrary, they have been beneficial in saving the traces, through which they traverse, from failure of crops to some extent. The only execution to this was the year 1899-1900.
- 26 Q. What do you think would be the best thing for the future?—Beyond sinking wells in involvable tracts and the construction of causle, no other remedy suggests itself to me.
- 27. Q. You say, "in my opinion it is desirable to stimulate the construction of new wells by more liberal advances"?—How would you do that; would you give smaller instalments or give up the interest?—I think the rules must be made more clastic and sympathetic in regard to recovering the advances. The conditions of repayment
- 28. Q What are the strict conditions of repayment which you would like to see removed P—The sowker generally lends money without any particular period of recovery. If Government were not to recover the instalments on the date on which they become due and give extensions of time that would be an inducement to well-sinkers.
- 20. Q. How many years do you give for repayment?—Generally ten; from five to ten.
- SD. Q. Why don't you allow more time?-That is the general practice.
- 31. Q. What is the Government term ?- Twenty years is the maximum.
- 32. Q. Why don't the District Officers give twenty years when that is allowed by law? - In practice we do not give the twenty years' time.
- S3. Q. Is there my concession which you think might be made?—In the case of well-sinking in some cover the people do not succeed on account of depth to which they have to go; in these cases if Government remitted the adsacre it would be a greet inducament.
- 31. Q. Don't you think that the cultivator might take advantage of that. He might spend the money on a different thing and then come and say "I tried but I can get no water"?—Such inclances may have economic, but are so few that they may be left out of consideration.
- 33. Q. You don't think it is vory common?—No; we have to guard against thom by frequent inspection of
- 36. Q. Do you find it difficult to recorer advances of taker? P-No; so far as my experience goes there is no diffionlty.
- 37. Q. Ther pay ?-Yes; an them au extension occasionally. and are very glad, if you give
- 38. Q. Havo you given thom extensions semetimes !-I have in some cases; not exactly in well-sinking but on goceral lorns.

- Mr. 39. Q. Do you think the rote of interest enght to be Bailmangal- lowered?—People don't care so much about interest because the present rate is low as compared with what the sowker charges.
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- 40. Q.—What does the sowker charge?—About 18 per cent. to 24 per cent. per aonnm.
- 41. Q. As much as 24 por cent ?-Yes; our rate is eo moderate that it is no use lowering it.
- 42. Q. Do you think if Gorernmout wore to say to the cultivator "We will pay you Rs. 500 to dig o well; we will not ask it back; only you must pay wet rotes for the future hy a stated periodical assessment changing every 30 years" would the onlivator take advantage of that nod build many wells ?—It will prove a very good inducement. The cultivator would pay a water rate if the iotial cost of einking a well is not charged to him. This concession will not be much availed of by rayate incomment. concession will not be much availed of by rayate inosmuch as irrigation by wells is attended with much expense and tronblo.
- 43. Q. You say the construction of tanks by private persons is not feasible.—No.
- 41. Q. Why not?—It is a speculation; so far as this district is concerved. The ramfall is precarious and there is no water. It depends entirely upon the facilities of getting noter; the chief thing is the certainty of finding water; if a man is assured that even in years of drought the supply would last one or two years then of course the Inamdars would run the huzard.
- 45. Q Are there many Innuidars in these places?-Not many enterprising Inaudars.
- 46. Q. When a cultivator takes a factor odvance and mokes a well, does ho expect to be charged the tret rate?

  —In the case of a new well, Government does not charge any extra rate.
- 47. Q. Does he know that?-Yos; because he only pays assessment on the land. Our rule is that we charge only the highest jarayat rate for well sunk from private capi-
- 48. Q. (Arr. Ibbelson)—You say in your note that there is no enhanced assessment during the currency of the present settlement?—Yes.
- 49. Q. What will happen at the next revision of settle-tent?—In the last revision there was a rule that in cases where well- are made from private capital the rate should not be enhanced.
- 60. Q. Do the people know that?—I think they know it; there may be some who do not know it; but in most instances the people do know it.
- 51. Q. If you know it is a permanent remission why do you nee the word, "doring the currenty of the present settlement"?—I have and that the sculement which we make is for a period of 30 years. That I think led mo to write the clause.
- 52 Q. You now know that no enhancement would be made after the currency of the present settlement?-Yes.
- 53. Q. Yet you put in these words?-Yes.
- 51. Q. (Mr. Higham)-Supposing there were a large 61. Q. (Mr. Higham)—Supposing there were a large irrigation work in bijspur with a constant unpply of water, what erop would the people irrigate? Would they grow sugarcame?—Yes; now people grow sugarcame from both well and canal irrigation. The fart is that the people of this district are not accurtomed to the irrigation of crops hat in the coarse of years when they become gradually according to it. I think they will grow sugarcame, plantains, cercals, and just in yirrigation.
- 55. Q. Would that take a great many years?-A good many years; hecause nuless to it. they become accastomed to
- 50, Q. Is the soil adapted for high class crops?—Yes; if a sufficient quantity of monure is used.
- 57. Q. How long does a well last?-It depends upon the structure; if it is well built with stone, it may last for a century or eo.
- 58. Q. You say in Dharwar tank irrigates more than 50 oerce?-Yes.
- 59. Q. Who are these entirely managed by ?-By the Irrigation Department.
- 60. Q. By whom are the larger tonks managed?-By the Irrightian Department.
- 61. Q. When a man wants to irrigate from one of the larger tanks does be have to said in an application?—There are some tanks which mit directly under the Irrigation

- Department for which they charge a water rate; in that case the people have to make applications for permission and pay the water rate which is charged according to the scale. There are many other tanks for cultivation on which a consolidated rate is charged. They don't charge a special water rate in such cases and no application is necessary.
- 62. Q. Not even when the tank is a large one?-It does not matter bow largs the tack is.
- 63. Q. Sopposing there are 2 or 3 villages irrigating from that tank don't they have to apply for water?—Woter is given in rotation; there are agents appointed who give it is turns and control the distribution.
- 64. Q. Are these agents appointed by the Irrigation Department ?-Yes.
- 65. Q. (The President)—You madegars "-Yes. mean the
- 66. Q. How can they work unless they have applica-tions. How are they to control the distribution?—My romarks apply to the tonks which are fed by the Dharma Canal. Mony tanks are fed by that canal. It is only in the case of these tacks that the Irrigation Department loterfere and control the water distribution.
- 67. Q. That is in Dharwar ?-Yes. In the case of village tanks the Patels and Airmanegars manage them; the area heing limited no difficulty arises.
- 63 Q. Do you think the 50 acres' limit might be iccreased; could a tank irrigating more than 50 acres be transferred to the monagement of the people themselves?—
  I think not; that would not work wall.
- 69. Q. Do you think it better that the lanks should be unter Gererment management than under the manage-ment of the people?—Yes.
- 70. Q. Even if they irrigate less than 50 neres?—Yes; that would do much better.
- 71. Q. In the case of certain tanks for which a water rato is realized if arrangements were made that the rillagers should poy something like an average for the last few years a fixed sum would they irrigate more freely?—That system would not in my opinion work well.
  - 73. Q. They would not irrigate a larger area?-No.
- 73. Q. Take the Muchkundi tank which irrigates acros; on that they pay an average argument of Rs. 111. Supposing they were asked to pay Rs. 111 down and then to take as much water as they liked would they brigate more than they do at present?—Who is to distribute the water? If the distribution is left to themselves then complaints would follow. One man by his influence would get more vater and wather less. water and unother less.
- 71. Q. Supposing that Government officials distribute. it; you give them as mach water as they like without charging anything more than Rs. 111; would they then take water?—I am of opinion that disinclination on the part of water?—I am of opinion that disinclination on the part of navats to take water for irrigation from Machkundi tank is due more to the insufficiency of supply for perenniol irrigation than to any other cause. The people are not necessioned to raise mons-on or other non-perennial crops. They generally do not need water for their ordinary dry crops in years of average rainfall. Their idea is thot canal water should be taken only for raising sugarcane and plantain crops and the existing supply bardly meets the requirements of the rayats for perennal irrigation.

  75. C. Why should not the Niguraporars distribute it 2...
- 75. Q. Why should not the Nirmanegars distribate it?the Dharwor district.
- 76. Q. (Mr. Mair-Mackenzie) Why should you not employ Nirmane, are here? -I don't see any objection.
- 77. Q. Oo the Mochkanditank why should not they have Arrangement Audulumnations was known and they awo kirmanegars?—In the first place the people in this district are not accordanted to irrigation. It is new to them. If they are put in the way by the appointment of the Nirmanegars they may utilize their acrvices.
  - 78. Q. It may be tried as an experiment ?-Yes.
- 79. Q. (Mr. Rajaratna Mdt)-Do yon know anything about the Nilgunds tank in this district?-I know that it bus been obsudoued.
- 80. Q. Why was it abandoned?-Owing to the insanilary condition of the village; the people said molarin pre-vailed there, especially in cold weather, and the tank was filled.
  - 81. Q. There was waterlogging at that time ?- Yes.
- 82. Q. In Dharwar the number of tanks shows o decrease in 1891-92 as compared with the figures for 1886-87. Could you explain the reason of that?—Yes a large

number were in disrepair, they were more attended to in 1893-94 or thereabouts.

- 83. Q. In 1899-1900 the area irrigated by tanks declined from about 89,000 acres to less than 20,000 acres !-Yes; that was of course due to famine.
- 84. Q. Was any remission of assessment granted on this tank?—No; there was some suspension in that year so far as I can remember.
- 85. Q. There are Government canals in Dharwar?-There are two.
- 86. Q. The area under the Government causles was 6,000 eeres in 1892-93; and it has gradually declined year by year. Do you knew the reason of it?—I have not made inquiries about it.
- 87. Q. The average area irrigated per well is given as 77 for Dhirwar, whereas it rises up to 800 in Bijapur and to 270 acres in Belganin. Why is it so small in Dharwar?—Well irrigation is not reserted to there on an extensive scale. There is a good tank system in Dharwar; and the people mainly depend on the tanks. I think that is the only reason.
- 88. Q. Yoo say "the existence of tanks does not raise the spring level of wells "t—No, that is a mistake. My answer needs correction. The existence of tanks does raise the spring level of weils to a large extent. I have experience of this with regard to the wells in the gardens of Hungul town and Huttimatur village in Kurajgi taluka of Dharant.
- 89. Q. Have yoo any reason to think that the system of recording the area irrigated is defective and that the small average is due to that cause !- Yes ; it may be so to some extent.
- 90. Q. At the revision of settlement is there not a general enhancement of assessment on all lands?—Yes, generally, but it depends upon circumstances. I remember rome cases in which the assessment was lowered at the revision in the year 1880-87 in the Badami taluka.
- 91. Q. Do you know of any taluka in which the recessment was enhanced at the revision owing to the rise in prices?—Of course there are such; but there are also eases in which assoment is lowered.
- 92. Q. Where enhanced assessment is charged have you reason to believe that it has been more on land with wells than on land without wells ?—In the case of well irrigation "the assessment is, as a rule, restricted to the highest dry crop rate; beyond that there is no enhancement.

- 93. Q. The rayats understand that?—Yes.
  94. Q. You give a statement at tho end of your note showing the proportions for Irrigation and for land revenue? would you explain how it is arrived at?-One-lifth for land and four-lifthe for water.
  - 95. Q. You work it out according to that rate !- Yes.
- 96. Q. As regards the management of tanks, those ltrigating less than 50 acros were honded over to the rayats or to the Rovenue officers?—The rayats manage them and repair them.
- 97. Q. They are bound to provide for the repairs of these tanks?-Yes, that is understood.
- 98. Q. Is any abotement made in the assessment?-No.
- 99. Q. Not as compensation for earrying out the repairs !- No.
- 100. Q. (Mr. Muir-Mackenzie)—The whole of your experieoco has been chiefly in the Dharwar district? Yes.
- 101. Q. The Hangai and Kod (34) thukas suffered badly from famine?—In 1899 they suffered to some extont.
- 102. Q. In those two talukas there are many tanks? -Yes.
- 103. Q. Are there meny tanks in the other talakas ?-A few.
  - 104. Q. Small tanks ?-No, not many.
- 105. Q. Are there many tanks in Karaggi ?- Only a fr. 17.
- 106. Q. How do they lie-to the west of the railway ?-
- 107. Q. Generally speaking the tracis in which many of those small tanks are, did not suffer in the least from famine ?- Yer.

108. Q. Do you think the existence of these small tanks contributed materially to the protection of these Baitmangattreets?—I cannot sey so. But the existence of the tanks and the fact that the tracts in which they lie receive early reinfell, have meinly contributed to the protection of these rouncil, have mainly contributed to the protection or these areas. In these tracts heavy rainfall instead of doing good causes damege to the dry crops. The people in sems places sow their lands with rice as well as the dry crops, such as jouri, bajri or ragi. If the rainfall proves sufficient and seasonable throughout the season, they raise their rice crop and neglect the less valeable justi or bajri. If, on the other hand, the rainfall proves insufficient they reap their dry crop and forego the rice. The rainfall though iosufficient for rice, is always enough for dry crops. Hence the nombian for rice, is always enough for dry crops. Hence the peculiar situation of the country between mailed on one side and the maidan or plains on the other may be said to have contri-buted to the protection of these siens from famlue.

109. Q. De you think it can be said there has been less suffering in these tracts owing to the existence of these tanks  $\ell$ —Yes.

- 110. Q. Would you therefore be prepared to advocate the construction by Government of more of these small tanks in the eastern parts?—The castern part is generally well adapted for growing cotton and juari.
- 111. Q. The construction of tanks would not be saitablo ?-No, I think not.
- 112. Q. In the western parts is the soil edapted for rice ?-Yes.
  - 113. Q. The soil is different ?-Yes.
- 114. Q. (The President)—Those western talukas are Malnur ?—Yos.
- 115. Q. (Mr. Ibbetsen)-What does that mean ?- They are hilly.
- 116. Q. (The President,—They never suffered very much from famino?—Last time they did suffer, i.e., in 1899-00 in some extent.
- 117. Q. (Mr. Muir-Mackenzie)—Because there was a short rainfall ?—Yes.
- 118. Q. In the castern parts is the soil suitable for making tanks?—No. I think not as suitable as the westom paris.
- 110. Q. When a mynt constructs a well without getting any takari from Goronment does he generally go to the sowkar for money?—Yes. But only well-to-do rayats generally invest their ospital in the cutorprise.
- 120. Q. The latter seldom have to go to the sowker ?-Vory seldom.
- 121. Q. Do they ever go to the sowker?-Yes, they do semetimes.
- 122. Q. What sort of agreement does the sewkar make? Yes, they demand so much interest.
- 123. Q. In how many years has the money to be returned?—There are eases in which it is not returned; the debt goes on from father to son.
- 121. Q. He does not contract to pay it back in a fixed number of years ?—No, when they raise a crop they pay the sowkar and again raise a locu from him; it is a sort of runuing account.
- 125. Q. If a sort of running arrangement could be made with Covernment do you think they would be ready to barrow from Government ?-I think so.
- 126. Q. Supposing Government decided upon neaudoning the interest and allowing the rayet to pay back a portion of the capitel advanced only, when it is convonient, do you think that would be a great inducement !—Yes; it is my opinion that many raynts would come forward.
- 127. Q. Do you think that the result would be that the rayal would never pay back the capital to Government?

  -No, certainly not; they are not so nufaithful, many would pay; the percentage of non-payers would not be more than I per cent. or 2 per cent.
- 128. Q. If left to themselves how long do you think they would take to repay the loan?—In good years they would come forward voluntarily; it would only be in years of searcity or bad harvest they would fail to pay.
- 129. Q. On an average would they pay back within 20 years?-Uertainly.
- 130. Q. You linvo a great deal of black cotton soil in your district !- Yes.
  - 131. Q. Is it very deep?-Yes.

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Mr. 132. Q. How far down is the muram?—Below 50 or 60 Bailmangal. feet.

kar. 133. Q. In Bijapne is the black cotton soll so deep?—

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- 134. Q. None of the parts of Dharwar in which you have served have block cotton soil so deep?—Approximately they have the same depth as Bijapar.
- 135. Q. Do you think there is anything in the soil that makes it badly suited for irrigation?—So far as well-irrigation is concerned it is expensive to go so desp.
- 136. Q. I want to know about the soil. Suppose canal water is given?—Even if canal water were given I don't think the myats would be prepared to avail themselves of the advantage on an extensive scals in the black cotton soil tracts for the following reasons:—
  - (1) In years of average rainfall the soil is more suitable for the raising of dry crops. The raising of dry crops is not attended with the trouble and exponse necessary for raising crops by irrigation; and the rate of assessment charged being low, the mast naturally is not inclined to take to irrigation.
  - (2) Another reason is the difficulty of getting sufficient manure for the entire area of lus holding.
  - (3) The third and the most important reason is that the rayate in the black soil tracts ere not accutomed to raise monsoon and other non-perennial crops by irrigation. Their general idea being that irrigation should be reserted to only for

rice and perennial crops such as sagarcase and plantaine. It is a question whether the canals would give sufficient sapply for perennial crops in years of short rainfall. The Dharma Canal in the Dharwar District failed to sapply water for the irrigation of rice in the lands commanded by that canal.

- 137. Q. The soil does not become olavey and cake?—If a sufficient quantity of manuro is put down and if the land is ullowed to lic fallow for sometime the salt efficeseace will not affect it.
  - 138. Q. Otherwise it would affect it ?-Yrs.
- 139. Q. Does not black soil erack?-Yes, black soil generally cracks.
- 140. Q. If it was irrigated, would not these cracks absorb a great deal of water?—It requires a heavy rainfall to fill up these eracks.
- 141. Q. Do you think that on account of the soil getting middy and clayey it would be difficult to work properly?

  —I think so.
- 142. Q. (Afr. Ibbetson).—In the case of a bania who lends money for wells, I suppose the rayat gives the bania a considerable portion of the erop each year?—He does.
- 143. Q. If he did not do that the bania would cease to advance money?—Generally the object of the sowkar is to get interest, it is with that view that they give edvances.
- 14L Q. I cappose if the rayat left off making payments of crops on his running account the sawker would take stops to recover his money?—Yes, he would.

WITNESS No. 69.—ME. KEISENANI BALLAL BRIDE, Mamlatdar of Bagalkot.

Answers to printed questions.

τ.

Mr. Bhide. 6 Jan. 02. Yes, they do; but new tanke for two or three years Question &c. 5.—Black after coastraction or until the cotton soil floor becomes coasolidated do not hold sufficient qoantity of water. Black soil dams could not be raised of more height than 10 to 12 feet except puddling. Stone-pitching is generally necessary up to the high-water mark insids the dams in order to stop clods of earth falling into the tank. The demand for water increases in the drought, but it also exists in ease of average rainfall. Of late years, far reasons unknown, the rainfall has become scauty and variable. It does not fall seasonably. In this tract it is quite enough for agricultural purposes if it mins 6 to 7 inches from June to August and an equal quantity from September to the end of November. In a year of se isomulo rainfall splendid harvests are reaped and after a good year a rayst coald lay by oven for the following year, paying the Government daes cavily, which are not high. The owners raiss owing to paacity of funds small dams in their black soils to hold the rain wotsr as far as possible, and if tanks are coastructed they would be reminerative.

A well with two (mots) water-lifts ordinarily irrigates
7. Wells.
Sacres of land, except in years of drought when only it irrigates half the above area. The rayats in this part would prefer tank irrigation to that of a well, as the cost of construction (lie, 540 to its. 1 000) and the hailing of water from the depth (50 feet) entail heavy expenditure. About 50 per cent, is paid generally by Government in the way of takavi for the construction of a well. A rayat speads the romaining sum out of his own pooket if he is a well-to-do man. In some eases it is noticed that a well has remained half finished for want of funds. The concession in this respect is that the assessment is not increased during the carrency of the present settlement. If a rayat digs to the depth agreed upon and fails to get water at that depth, Government should immodutely give him the sum required to complete his well on his personal or other secarity. The interest charged is not high and one could not get money at such a low rate of interest as 5 per cent, however solvent the security may be. At present the Collector allows ordinavily ten instalments of the lonus greated both for wells and dams. In order to stimulate well-irrigation the period of repayment may be extended to 20 in all coses of loaas, except where the rayat himself agrees to repay carlier. Owing to anceessive droughts most of the wells ran dry, and they were deepened by taking out cell. But as they did not supply sufficient quantity of water, two or three holes were bored at the bottom with loag iron crowbars until they reached the water strata in the sub-soil. The water tappod through these holes less that furnished for irrigation, and enabled a rayat with his family and

bullocks to pall through the drought without going to a relief work. To enable the prompt payment of tukuri separate establishment with proper supervising agency might be created. It should move from village to village inspecting old works and sxamining now projects and issoing obeques on the Tulaka sob-treasury for payment of the loans required.

8. Drainage works. No drainage works are required in this part of the country.

The only irrigation work in this telloka is a tank in the 10, Programmes of relief village of Muchkandi. Ordiworks.

narily it irrigates 110 acres of 12, Yaluo of works in land. The water rate for the

14. Yaluo of works in land. The water rate for the reducing claims for famine perennial crops is Rs. 8. A proreduction ject of constructing a tank at Kalaskop near Kaladgi is under consideration. No systematic programmes exist for irrigation works. Famine relief was regoired in all its forms in the villages solmerged by the Muchkaudi Tank owing to the tailure of water in the tank.

II. A.-General.

Question No. 1.—To the Bagalkot Taluka of the Bijúpur District. I have served both as Mamlatdar and District Deputy Collector during the past two years and a half in the Bijápur District.

No. 2.—The average minfall of this taloka is us shown below:—

Mon	hs.		Rain	ifall.	Month	ı.	Pair	fall.
			las.	cts.			 Ius,	ctz.
January		•	0	1	July		í	δ <b>4</b>
February			0	31	Angast		0	90
March			0	6	September		6	22
April .			1	73	October		2	77
May .	•		1	86	November		*10	85
Jone .	•		3	41	Decombsr	٠,		

No. 3.-Except Nos. 5 and 6 my replies to others are in the negative.

Mr

Bhide.

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No. 5.—Yes; the loans are freely taken. For the construction of a well the sum advanced generally falls short of the requirement under the existing practice. I have seen many a well constructed ont of takavi half fanished owing to want of capital. It usually happens that an advance is made up to 20 times the assessment of the land offered as security; but it does not answer the purpose in question. Moreover, a myst can get more money on the security of his said land by going to a sowkar. I would therefore suggest that sufficient money required to sink a well may be advanced on the security of land taking into consideration its market value in a favourable scason. I would also suggest the remission of the money spent in case of the failure to obtain water and the extension of the period of repayments from 10 to 20 where necessary.

#### D.-Tanks.

No. 23,-(1)-By rain water.

(2)-By small water channels.

(3) (a) -Two years.

(b)-One year.

(c)-Four months.

E .- Wells.

No. SA .- (1)-Fifty feet.

(2)—There are very few springs in the sub-soil and water is generally obtained by percolation. The percolation supply runs short in a year of drought.

- (3)—Rs. 800 to 1,000.
- (4)-Fifty years.
- (5) -By water-lifts called mots.
- (6)-Eight acres.
- (7)-Eight acres.

No. 25.—Irrigation increases the value of the produce of the land by twofold by rendering it possible to cultivate two harrests instead of one. In a year of ample rainfall the yield would be double, and in a year of scanty minfall it will be what it would have yielded in a year of average rainfall without irrigation, and in a year of drought one-fifth of the ordinary year.

No. 36-(1)-Its. 50 per acre.

(2) - Rs. 10 per aere.

No. 37 .- (1)-Rs. 25 per nere.

(2)-Nil.

These rates are paid on the total area attached to a well.

No. 38.—(1 and 2)—No difficulty is encountered either in the selection of sites for wells or in their construction.

No. 39.—I am not in favour of the construction by Government of wells in the land which is private property as it would entail a heavy expense.

No. 40.—Temporary wells are not used in this district.

- 1. Q. (The President)—You are Mamlatder of Bagal-
- 2. Q. How long have you been in that place?—For the part six months only; before that I was District Deputy Collector for two years in charge of Indi and Sindgi talukas of this district.
- 3. Q. Have you seen a great deal of black cotton soil in this district?—Yes.
- 4. Q. Do they make wells in it or not?-Not in very black soil.
- 5. Q. Why !-Because there is no water strata or springs at the bottom.
- 6. Q. Wells don't pass through rock in this district?—No.
- 7. Q. They merely go down to the soil?—Yes, there is urst black soil, then muram and then rock.
- 8. Q. Sometimes the black soil is so deep that they don't go through it at all?—Yes.
- 9. Q. In that case wells do not sacceed P-No.
- 10. Q. You say that a well with two mote ordinarily irricates eight acres of land except in a year of drought when it only irrigates half that area. What is the reason for that; why should it go down as much as half P—Because the level of water goes down, consequently it is very troublesome to raise water.
- 11. Q. Does a well often run dry altogether?—In a year of drought it does, but in ordinary years it does act.
- 12. Q. Dors not a cultivator use greater economy in regard to water in dry years?—He irrigates only a small area in such years.
- 13. Q. You say "about 50 per cent. of the cost of a well is paid generally by Government by 10caus of takavi for the construction of wells." Would the rayst not have to go to the sawkar for the difference?—He would not get it as he has mortgaged his own land for the takavi and would tind it very difficult to get mosey from the sawkar.
- 14. Q. You propose that Government should give the sum required to complete the well?—Yes.
- 15. Q. Do you think a number of wolls are left uncompleted?—Yes; nearly one-fourth-
- 16. Q. They are not used ?—No. Either the site chosen was a bid one, or they may not have had sufficient funds to complete the well.
- 17. Q. Do you think that it is desirable that there should be extension of wells in the country for the good of the people?—I do.
- 18. Q. What would you recommend as the best means to protect the country in case of another faraine occurring?

  —Instead of wells the rivers should be bunded up to stop the water from running into the sea; and large irrigation tanks should be built after making caroful irrigation surveys.

- 19. Q. Suppose that is found too expensive, then you would recommend the construction of wells?—No, not in the black soil.
- 20. Q. Then what about the people who live in the black soil areas?—They would have to leave their villages.
- 21. Q. If you make bands on the rivers and the rivers ran dry then the bunds will rua dry?—We could keep a supply of water in the reservoir for two years.
- 22. Q. Then you must have reservoirs?—Yes, we must construct a tank that will store a two years' supply at least.
- 23. Q. You have one such tank—the Muchkondi—on which apparently a good deal of money was spent, but it irrigates only 40 acres ?—About 100 acres.
- 24 Q. Well, even that is not encouraging ?-No, not at all.
- 25. Q. What do you think is the reason of that?—It does not hold a sufficient quantity of water.
- 2G. Q. We were told that every year water is loft in it and that the people never use all the water?—That is the case, but if water was available regularly they would use it
  - 27. Q. Are you satisfied about that?-Yes.
  - 28. Q. The tank is in your taluka?-Yes.
- 29. Q. (Mr. Muir-Mackenzie)—How many years have rou been there!—Only for six months. I was Chitnari here for two years and then District Deputy Collector.
  - 30. Q. Were you not there before 1806-97 P-No.
- 31. Q. In 1895-96 where were you?-In the Karwar District.
- 32. Q. (The President)—Could you give me may reason as to why the people are using the Muchkundi tank so littlef.—They do not use it because the supply is uncertain.
- 38. Q. Do you think that the period of 10 payracat for taken ought to be extended to 20 years f Yes.
- 34. Q. Could you tell us why the full limit allowed by law is not allowed?—It is not the practice. I cannot say why.
- 35. Q. Everybody seems to think it ought to be done, but nobody does it?-No.
- 36. Q. Do you think it would be a good thing if Government gave takeri freely for wells !—Yes; there could be no harm in that.
- 37. Q. Do you think it would induce people to make wells?-Yes.
- II. Q. Van wardik recommend it. for the black relican will country  ${}^{p}$ —No.
- 39. Q. What do you propose to do thore?—Nothing is possible there.
- 40. Q. (Mr. Ibbetson)—Suppore you gave them canal water, what then !- They would use in bad times.

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- 41. Q. Only in bud times?—Yes, in ardinary years they can do without water.
- 42. Q. (The President)—In what part of the country is the proportion of black cotton coil the greatest?—In the eastern portion.
  - 43. Q. Not in the western parts ?-Na.
- 44. Q. (Mr. Ibbetson)—In this black soil what crop do they grow ?—They graw cotton, rabi, juari, gram and wheat.
  - 45. Q. Mostly ?-Rabl, justi and wheat.
  - 46. Q. Nat mostly cotton ?-Na.
- 47. Q. You say in your note that when a man has made a well fram his own money the cancession is that assessment

- is not increased during the currency of the present settlement?- Tes.
- 48. Q. What happens at the revision of sett'ement?— The improvement is taken into consideration and the assessment is increased.
- 49. Q. He gets enhanced assessment on account of it?—
- 50. Q. (Mr. Muir-Mackenzie)—Dun't you know that the provisions of the Lund Revenue Code expressly lay down that the improvements of myats should not be taken into consideration in making a revision of the settlement!—There is to be no increase during the currency of the settlement anly.
- 51. Q. Na increase even at the revision of scittlement?' -- I did not know that.

# WITNESS No. 70.—MR. RIMCHANDRA HANMANT BRYUR, Mumlatdar of Indi. Answers to printed questions.

Mr. Bevur.

- 1. § 1.—The saswers below refer to the Indi taluka in the District of Bijappr. I have been Momlatdar of this talukn for nearly three years, and I have had many opportunities of being sequainted with the taluka.
- 2. § 2.—The rainfall for the last nine years is as follows, there being no recard thereof before 1892:—

Years.							Inches.
1892						•	47.65
1893						•	40.7
1894			•			•	21.66
1895							27:35
1896			•				<b>~13.33</b>
1897	·	Ċ					22.57
1898		ì	٠				24:45
1899			_				12:35
1900	·	·		ì			16.53
7000	•	•	•	•	-		

The decrease from year to year is worth noting and the question of the reservation of some areas for the growth of trees, which attract clouds, may be considered.

The average monthly rainfall for the lust nine years is

Months.						Inches.
January					•	.02
February		•	•			.036
March .						•38
April .		•				•73
Mny						1.29
Juno .						2.54
July	•					3.05
Aogust .				•	•	3.16
Septembor						7.84
October .			•			4.38
November	•					0.73
December				•	•	0.0
					'	25.163

- 3. § 3.—There is no obstacle to the extension of irrigation arising from—
  - (1) sparsity of population;
  - (2) insufficient supply af cattle ; or
  - (3) inenfficient supply of manure;

but there is some obstacle an account of-

- (4) the unsuitability of the black soil to irrigation;
- (5) the uncertainty of the supply of water;
- (6) lack of eapital ; and
- (7) fear af enhanced revouue.
- 4. § 4.—Under the present law (Section 107, Bom., L. R. Code) assessment cannot be increased on necount of improvements effected by private capital. Tenants scarcely undertake any work of improvement at their own cost, there being no tenants af permanent tenaro in this talnka.

5. § 5.-Leans under the Land Improvement Act are freely taken by the people for the construction of wells and the erection of large dams.

I am not in favour of-

- (1) reduction of the rate of intorest, or
- (2) remission of interest;

hnt I recommend partial or total remission of ndvance in case of partial or total failure of the attempt to obtain water. The present rules are sufficiently liberal as regards the period of repayment, which can be extended up to ten years by the Assistant or Doputy Collectors.

- . I cannot recammend any grant-in-aid as people will attach very little importance far such small money rewards. The only encouragement that occurs to my mind is that if any landbolder constructs any canal or well coas to irrigate a certain area, ahout one-tenth of that aren may be declered so his Inam with or without a fixed judi. It is said that in old times the Rajahe af Mysore had made it as a rule that anybody might constroot any irrigational works anywhere, and he would get ane-tenth af the area thereby irrigated as his Inam; and the above suggestion is based on this tradition.
- 6. § 6.—Extension of irrigation is not at all likely ta injure the remaining cultivation by attracting its cultivators.

People do evinae a strong desire to have the means of irrigation increased.

#### B .- Canals of continuous flow.

- 7. § 7.—There is only one could of continuous flow in this thinks. By creeting a temporary dam across the Indi Nala water is diverted to the ennal which is about a mile in length, and it irrigates 17 fields of an aggregate area of 115 neres. In this irrigated area two harrests are generally cultivated. Generally there is no difference in the yield in a year of ample ranifull or in a year of ordinary rainfall, for the increased water cannot rise to the ordinarily unirrigated portion of the lands; But in a year of drought the yield is reduced by nearly half or sometimes more.
- 8. § 8.—The approximate increase of produce per acreduc to irrigation can be estimated at—
  - (1) three times the ordinary produce of a narmal year of ordinary rainfall;
  - (2) twice the ardinary produce in a year of drought."

Generally an acre of such land when not irrigated produces about 4 bags of earn, generally joars, but when irrigated produces about 12 bags of whent or paddy; and in a year of drought the yield would be about 8, instead of 12 bags. Money value cannot be given as the same depende upon the prevailing prices of the different kinds of

9. § 9.—This Indi Canal is owned by the owners of all the 17 lands jointly, and when my land is let to tenants a fixed rent is levied. The tenmt now pays a rent of about Rs. 12 per nore, while if the land were not irrigated ho would have paid Rs. 3 per acre; thus the increase of rent is Rs. 9 per acre due to the canal.

Ordinarily lands of the same soil as these are assessed at Ro. 1 per nere, but these lands on account of the irrigation advantage are assessed at Rs. 6 per acre. Thus the enhancement of revenue is Rs. 5 per acre. The enhanced revenue is fixed once for all on the whols irrigable area in ench sorrey number at the time of the last Bevision Settlsment.

10. § 10.—The annual cost of repairing the canal (which is not in any way built) comes to about Rs. 100 or Re. 1 per acre of the land irrigated. This expenditure is borne by all the ewners of the irrigated lands in proportion to their mreas. To prepare the land for irrigation about three times the cost of a dry crop land is necessary. The calianced expenditure may be approximately estimated at Rs. 3 per acre. When the land is worked by a teanny he incus this increased expenditure, and this fact is taken into consideration when tixing the annual rent.

11. § 11.—The water in the canal is never too profess to canae ony damage whatever.

## " C .- CANALS OF INTERMITTENT PLOW.

- 12. §§ 12-10.—There are some small canals to the villages of Horti, Halgunki and Kolorgi, which ran about six or eight mouths of the year. They are worked and used on the same lines as described above. The increase of assessment is the LaGanal that of runt is the increase are. The total area irrigated is the three villages is about 100 acres.
- 13. § 20.—The cost of repairing the canal is about four annas per acro. The canals are two small to require any legislation.
- 14. § 21:—The canals in those villages os well as in Indi are constructed by private persons. Scarcely any difficulties arise in the distribution of water as hours are fixed for each of the lauds under the command of the canal. It has never been found necessary for Government to take over the management of these canals.
- 15. § 22.—In this taluta there are very few sites suitable for the construction of further small caush hy private persons. Lorge projects however are possible in some places which must be undertaken by Government as they are likely to cost very large sums. I enclose herewith a statement of suggested large irrigational projects, which I once cabmitted to the Collector.

#### D.-TANKS.

16. §§ 23-33. There are no tanks in this taluka.

#### E .- WELLS.

- 17. § 34.—In thie túluka-
  - (1) the average depth of permanent wells is 40 feet;
  - (2) the supply of water is generally from springs and it is liable to fail in a year of drought only. The water never becomes salme.
  - (3) The average cost of construction of a well is-
    - (a) Rs. 300 in the case of a kachcha well, and
    - (b) Rs. 700 in the case of a pakka masonry well.
- 1. Q. (The President.)—You say in paragraph 5 of your momorandum "I am not in fuvour of (1) reduction of the rate of interest, or (2) remission of interest, but I recommend partial or total remission of advance in case of partial or total failure of the attempt to obtain water." Do you think the present rules are sufficiently liberal?—They can be extended up to 20 years, in practice they are extended only to to nearly 20 years is not given.
  - 2. Q. Twenty years ought to be given ?-Yes.
- 3. Q. You say again "there is only one canal of continuous flow in this taluka. By electing a tomporary dam across the Indi Nala water is diverted to the canal, which is about a mile in longth, and it irrigates 17 fields of an aggregate area of 115 acros." That is a tomporary bandhara?—Yes.
- 4. Q. Is there only one of these bandharas? Why don't the people make more?—There is only one.
- · 5. · Q. Is there any reason for that; is the whole of the water taken up?—The whole of the water is taken away, but since re-appears below the bund.

(4) A kachcha well lasts for about 50 years if care is taken to repair it every year, and a pakka well may last for about 100 years. Wells are often liable to be damaged in ease of very excessive rainfall.

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- (5) Water is raised by môt. .
- (6) The average nrea commanded by n well is about six acres.
- (7) The average area irrigated in any one year by a well is about five occes.
- 18. § 35.—By mot irrigation two harvests can be contivated and also more valuable crops can be substituted for the less according to the convenience of the cultivator. On this account the value of the produce is increased to three times the dry-crop produce.

The yield also increases-

- (a) to three times the quantity in a year of ample rainfall;
- (6) to two times in a year of scanty rainfall; and
- (c) in a year of drought about 25 per cent. less than the ordinary dry-crop produce.

The cost of working môt is rather heavy. In e year of drought wells are often liable to fail and are required to be cleased of the silt or deepened if necessary which also costs a substantial sum.

- 19. § 36 -(I'ido paragraph 8 above).
- 20. § 37.—(1) The tenant pays about Re. 1 per acrs as the extra rent on account of well-irrigation. (2) The Government assessment is not generally increased on account of well-irrigation.
  - 21. § 38.—No serious difficulties ore encountered-
    - (1) in the selection of sites for the wells, or
    - 13) in the actual construction thereof.

No assistance in any shape whalever has ever been offered by Government or local bodies to the people in the construction of wells. The only assistance the people would require is in the selection of a spot where the required anpply of water would be obtained, and this can be done by the appointment of an expert officer for the district.

- 22. § 39. I am not in favour of the construction of wells in private lands by Government for various reasons. The construction of a well by Government costs a far more heavy sum than what would be incurred by a private person, who would therefore be very much rejuctant to bear the burden thereof. The Government officer in charge of the work and the owner are not unlikely to be in coulliet as negards the shape, size, etc., of the well. People have some superstitions of their own, and the officer would not readily accede to their wishes ie all minor particulars.
- 23. § 49. Temporary wells called Budkis are sank in the beds of nallas and used for growing some fodder or other crops. They are a very small protection against drought. Wherever possible people sink such Budkis and no encouragement is needed. In this talukn sites suitable for such Budkis are very few.
- 6. Q. Have you any other rivers in your taluka?—Yes, the Bhima; 23 villages are situated on the river.
- 7. Q. You say there are some small counts in the villages of Horti, Halgnuiki and Kolargi. What river are these upon?—They are small strenms, simply nains, they have small temporary bandharas; since 1896 water has very seldom run through the canal and very small areas have been irrigated from these streams. I find that in 1895-96 there were 100 acres irrigated, in 1896-97, 80 acres, in 1897-98, 110 acres, in 1898-99, 103 acres, in 1899-1900, 86 acres and in 1801 there were 113 acres.
- 8. Q. This one bandhard takes off the whole of the water?—Yos, but some water comes out by percolation.
- 9. Q. You say in paragraph 15" in this taluka there are very few sites suitable for the construction of further small canals by private persons. Large projects, however, are possible in some places which must be undertaken by Gararmana as they are likely to cost very large sams." In saying that have you any places in your mind's cyc?—Yes, please see list accompanying my memorandum.

Mr. Becur.

- 10. Q Have you discussed these at all with the Executive Engineer?—No.
- 11. Q. How long have you been in this talnka f—Three years, I was also 3½ years io Indi before.
- 12. Q. These nalas that you mention on page 7, was there any water in them in these years of drought?—In the hot season there is very little water, if bandharas are huilt the water will remain.
- 13. Q. Will it he worth while to huild bandharas there?
  -Yes, because some lands are sure to be irrigated.
- 14. Q. This Indi canal is managed by the people themselves?—Yes.
- 15. Q. Do you think if Government huilt bandharas on these streams that the people would orrange the irrigation?

  —Yes.
- 16. Q. In places where there are no nalas, what do you do?—So far as Indi is concerned, it is full of nales. If the flood water of all the valos was availed of the taluka would be protected to n great extent. Sluioo gates may he constructed on rocky edges of nallahs and the river through which inundation water might ron to taoks kept ready previously excevated; and these taoks can irrigate the lands erocoed in winter and summer.
- 17. Q. Have you any figures of the irrigation on the nallabs in these years of droogbt?—No.
- 18. Q. How long would water remain in these nallahs that you have mentioned here in a year of drought?—I think oboot five or six mouths.
- 19. Q. Up to Mnroh?—It will accumulate in the rainy season and last for five or six months
- 20. Q. Hove these nales water in them now ?-Some are running.
- 21. Q. (Mr. Higham.)—You speak of dry stons dams, how do they hold water?—The walls are built of dry stone with mud.
- 22. Q. Does the water leak through?—Not if it is sufficiently thick, there are mesonry duets in the middle to allow the water to go through.
  - 23. Q. When were these made?—Ahout 40 years ago.
- 24. Q. When did they breach ?- About 20 years ago.
- 25. Q. How have you ascertained that?-From what I have heard from the old people of the village.
- 26. Q. I suppose they had no waste-weir?—The reason of ite boing breached is owing to the waste-weir being too small or to excessive rain.
- 27. Q. Do yoo know of bandharss having been huill by private parties oince the last settlement?—No.
- 28. Q. None ore heing hailt now?-No.
- 29. Q. Are there ony places in which they might be huilt?—Yes on these smoll nales they could be built.
- SO. Q. Why don't they boild them?—It would not irrigate one field only, but come others, and combination is not possible among the rayats.
- 31. Q. They used to combine to build them, they combined to build those you spoke of—the Indi Nuln?—That has become n constom emong the Indi people as the bandhara has been existing since over n hundred years; they do combine now to renew it; but it is only a temporary bandhara constructed every year after the rains.
- 32. Q. Then the other works that you mention are also huilt by private people?—They only irrigate a few fields.
- 33. Q. Do you think the people used to combine and that they eacnot combine may longer P—It oppears so.
- 34. Q. What is the reason of that?—Each thinks himself wiser than the other. No particular reason can be assigned for this.
- 35. Q. Supposing they did make the bandharas, what would they have to pay in the woy of water-inte?—According to the quantity of the woter, the rate would range from Re. 1 to Rs. 4 an acre.
- 36. Q. Would that he a water-rate?-Yes, additional
- 37. Q. (Mr. Ibbetson.)—The Indi people pay Rs. 5?—Yes, a consolidated assessment of Rs. 5 per ocre.
- 38. Q. (Mr. Higham.)—Sapposing they hadn't to pay anything to Government for making a bandhara, do you think they would make it then, and would it indues them to combine?—Yes, but they would have to be pointed out the site of the bandhara and the position of the canals.

- So. Q. (Mr. Ibbetson.)—You say in your note that in your taloks "tenants scarcely undertake any work of improvement at their own east, there heing no tonouts of permanent tenure." Do you think there ore many tenants who would undertake works of that sort, if the law protected them?—Xes.
- 40. Q. Do you think many of thom are sufficiently well off?—Yes, there are a few, not many.
- 41. Q. Supposing that opart from the permanent tennre, the law secured a tenant for a certain time till the value of his improvement was worked out, would that he sufficient, do you think?—It would not be sufficient naless he had a permanent tenore.
- 42. Q. You say that you would not extend the period of repayment beyond ten years, do you think ten years is enough?—It may be extended to 20 years.
- 43. Q. You say in your meme, regarding the construction of wells "I conuct recommend any grant-in-aid as people will attach very little importance to such small money rewords." Supposing Government said to the people of a very had tract in the district, "if you make a well, costing Rs. 300, we will give you the whole and will coly recover Rs. 400, the other Rs. 400 hoing a free gift." Woold that be on inducement to them to huild wells ?—Yes.
  - 44. Q. Would that not be a great inducement ?- Yes.
- 45. Q. You did not refer to that when you said you would not recommend a grant-in-aid?—No.
- 46. Q. You say "the only encoorsement that occurs to my mind is that if any landholder canstructs any caoal or well, so as to irrigate a certain area, about one-tenth of that area may be declored as his imam with or without a fixed judi." Has that been tried?—No.
- 47. Q. Will that io your opinion he an ioducement?—Yes, it will go to their posterity.
- 48. Q. Have you had any experience of an arrangement of that kind in Natire States ?- No.
- Mr. Rajaratna Malr. explained that Government relinquishes dry assessment on one-tenth of the land, but takes wet revenue on the romaining area.
- 49. Q. You say on page 4"the average area irrigated in any one year by a well Is about 12 neres." How many mots would that he?—Twelve is a mislake, it should he five or six, there would be one mot.
  - 50. Q. Would one mot irrigate fire or six acres ?-Yes.
- 51. Q. Do you mean that they would work half in the kharif and half in the rabi?—There wil be no difference, eix ocres would be nader irrigation at the same time.
- 52. Q. How long bave yon been in this district ?—I have been here these three years, before that I was here for three years.
- 53. Q. What happened to the wells in 1898-97, did they fail much?—I was not in this district at the time.
  - 54. Q. In 1899-1900 did they fail much ?-Yes.
  - 55. Q. When did they begin to fail?-In January.
  - 56. Q. Did they get worse and worse?-Yes.
  - 57. Q. Werother worse next year ?—Yes. 58. Q. And worse still this year ?—Yes.
- 59. Q. Now this year what proportion of the ordinary area will they irrigate?—Only nbout half.
- 60. Q. So that the failure in the first year was not a
- large proportion?—No.
  61. Q. Would they irrigate four-fifths?—Yes, one-fifth failed in the first year.
  - 62. Q. And ooo-holf after three years ?-Yes.
- 63. Q. (Mr. Rajaratna Mdlr.)—You said there is difficulty in inducing rayats to combine to construct a bandhara; supposing that a capitalist is allowed to lovy a water-rate on londs helonging to other rayats for water supply from the bandhara, will that ho sufficient to induce them to construct bandharas?—Yes, that will he no inducement to some extent, the sowar or capitalist will indoce them to toke water to ensure his water rate.
- 64. Q. Supposing he levies the useal water-rate from other people and that his own payment to Government is redoced to one-balf or one-third, will that act as a further inducement to construct bhandaras?—Yes.
- 65. Q. (The President.)—Cannot the Mamlatdar induce them to combine just as well with a little personsion, why do you require to got the soncer in?—In some cases it is possible; the selection of the sites must be made by expert officers; if once it is constructed, they will combine.

- 66. Q. (Mr. Rajaratna Mdlr).—How large an area will be brought under irrigation if all the nallahs in your talaka are fully utilized?—About 30,000 to 40,000 acres if all the nallahs were utilized; the flood water could olso, be availed of to some extent.
  - . 67. Q. How high is the kacheha band on the Indi?—About four to five feet high.
  - 68. Q. You say in pargraph 20 "The Government assessment is not generally increased on account of well irrigation." Some people four that the assessment will be increased?—Enhancement of assessment depends on prices, it is possible that the essessment will be raised to some extent.
  - 69. Q. (Mr. Muir-Mackenzie.)-In your toluka there are n great many tale !-- Yes.
  - 70. Q. De you think a great many more might be made?-Tes.
    - 71. Q. Do you think they are beneficial ?-Yes.
  - 72. Q. In whit way?—They are generally on the slope of the fields and water accommlates inside these tals, besides which mud silts there and a good orop results.
- 53 Q. Is there a crap eran in a year of draught?—Yes; a good crop wherever the water neumulates; this year we have a good crop behind these 'arnis' the special term of this talukn for "Tals."
- 74. Q. Yon were in the taluka during the famine?—In this famine, act in 1896.
- 75. Q. What were the people chiefly employed on P-Most of the people left the district and went to other places.
- 76 Q. Were there any famine relief works? Yes; the Sangogi tank work-
- 77. Q. Wonld'it have been n good thing to employ them on making bunds and tals or arms?—The arms have to be built on private laads, and it is not possible for Government to build thom.
- 78. Q. Why ?-The owner might have his own way of building thom, and the two ogencies might not agree.
  - 79. Q. Do you think the owner would object ?-Yes.
- 80. Q. I don't mean that the owners have to pay if Gorerument build it P—Then they will agree, people have superstitions as to the direction in which to construct the works and the day of the week to begin, but such slight difficulties could be got over.

- 81. Q. There is not much black soil in your taluka ?-
- 82. Q. Only on the bank of the river ?-Yes, and in the castern side of the taluka around the village of Tambe.
- 88. Q. Wolls are mostly snak in muram?—Yes, and in white soil also.
- 84. Q Have you found many disased wells in your talukn?—Yes.
- 85. Q. When were they made?—About 50 or 100 years age; they have been allowed to lie anrepaired as they got damaged by excessive rain and the rayats could not rebuild them, in the famine such wells were utilized when the rayats could got money to repair them.
- . 86. Q. Very often then a disused well might become ascful in a year of famine?—About 25 per coot. of the disused wells came icto use in this famine.
- 87. Q. Have yoo ever heard that rayats object to take takavi on account of the rigidity of its collection?—There are very few who are relaciant to take it; in a good year they may not be so ready to do so and some coacession should be allowed.
- SS. Q. What concession f—The attachment of movable property should not be taken in land for at least six ments after the date of default and one year in the case of immovable property; one year might be allowed before bis land is attached for payment of takavi. To ensure prompt payments of the advances, the Mamlatdar may be authorized to sauction takavi up to Rs. 200 or Rs. 500. If the Mamlatdar can senetion takavi up to Rs. 200 for seed machtle, as is the case new, there is no reason why he should not sanction up to the same amount for land improvement.
- 89. Q. You don't think that instalmoats should be longer?—They might be extended up to 20 years.
- CO. Q. You say the present rules are sufficiently liberal?
  —They could be extended ap to 20 years, but ten years has become the practice.
- 91. Q What is the reason that it has become the practice?—I don't know there may be some old orders on the point.
- 92. Q. (Mr. Ibbetson.)—Beyond ten years, do you send to the Collector?—Yes.
- 93. Q. You can smotion ap to ten years yourself?—The Assistant Collector can do so, the Mamlatday has no power to sanotion taken for land improvement.

Witness No. 71-Ma. Daso Balwant Berioedi -- Mamlatdar of Hungand, Bijapur District.

Answers to printed questions.

3. Small tanks constructed in black soil will certainly hold water if the soil is dug out 15 feet deep and on earthen dam of sufficient width is put up. The dam of course should have neore wall of dry stone inside and the other side of the dam should be lined with a thick layer of muram, or else the dam should be lined with a thick layer of the water current. No maseary wall is required, save the inlet and the sluice, which should be of maseary work. But there is one great defect in the tank of the black soil. It is generally silted up very quickly. The silt will have to be removed every decade of years and with this recurring expenditure the tank will be a success. Of late the rainfall is said to have been seantier every year compared with the fell before twenty years back. Asseming that the average rainfall is good there is not much demand far water for codinary dry crop. If water be made evailable people will not only make use of it in prolonged drength, but also for growing garden crops, which will only be grown by irrigation even in favourable years, because the garden erep is much more paying and profitable than the dry crop. In the case of black soil the demand for water is nover slack even though the rainfall be very good and the revenue will nover be precarious on acceant of the fulling off of the irrigated area. Owing to apathy end slevenliness on the part of the cultivators in thus taluka they were content with whatever the lands used io yield, and the land was generally yielding a bumper crop as the rainfall was plontiful and seasonable in good old times. But series of inilure of crops since the great momerable famine of 1877 has stimuleted the cultivators to device and array out all possible agion tural improvements, and the conversion of the dry crop into garden crop land is considered to be the best and safest improvement. It will therefore be seen that there will certainly be as much demand for irrigation in black soil, and the construction of tank for black soil is considered as

remunerative and as important os for other classes of seil. The irrigational prespects in lands which are mostly black soil under the command of the Gokak Ghataprabha canal will bear me out. I may also add that a greater area of irrigated land under the command of Mugad Tank in Kod Taluka and Dharma canal in Haugal Taluka in Dharwar Collectorate is black soil. From my own personal experious I may say that the part where Ghataprabha canal in Gokak Taluka now runs was constantly liable to famine. But siace the opening of the casel famine is not heard of

there.

7. Yes. It is both possible and desirable to slimulate the construction of new wells by more liberal advances and inducements. The only practical inducement I one suggest is to make advance without interest. Owing to the long drought I am sold about a dezen of wells ran dry and have been deepend, of which I have seen five and found in them a sufficient supply of water. I have not come across with any instance in which an old well which ran dry was deepened and abandened for want of water, but I have seen two now wells which were dug up and abandened as the water was not struck and the further excavation was likely to entail considerable expenditure which the owner was unable to previde. Average depth of water below surface in this taluka is 45 feet, and the cost of the well varies according to its size and the quality of sub-soil and the distance at which stones are obtainable. On an average the cost is about Rs. 800. Generally the part of the well below the pulleys to draw water from is constructed in this taluka with stone and mertar and the other part of the well with dry rubbles only. The average area served by each well with one met and one pair of bullcoks is three acres.

8. The truet in this taluka having been almost plaiu, erops are never heard of as having been injured by water-

Mr. Bevur. 6 Jan. (12.

Mr. Betigeri. 6 Jnn. 02. Mr. Beligeri. 6 Jan. 02.

logging or excess of water in very wet years. Drainage works logging or excess of water in very wet years. Drainage works are therefore not required on agricultural grounds. Small pits dag out for depositing manare adjacent to the village site are seen in some villages. Water stagnates in these plts which are objectionable on smitary grounds, but such nuisonces can be pat a stop to by the adoption of vigorous measures under the Polico Act. No drainage works are therefore required even on sanitary grounds.

10. The relief works entered in the famine programmo that have been executed during the last famine may. I think, be maintained in good order; otherwise large ontlay incarred by Government during the famines will be deemed to have been wasted. I do not think it necessary for extending or completing the works entered in the programmo until the next famine. But I would respectfully suggest the insertiou, as a large relief work, of the Balkundi Nala. My proposal on this work will be submitted next month after visiting the work one one.

14. No large irrigation work was constructed either by Government or by public with the aid of tagai advances during the famine of 1897. No information required in this paragraph can therefore be giren.

#### A. - GENCEAL.

- 1. The foregoing answers belong to the Hungund Taluka, Bijapur District. As a District Inspector of Agriculture for about two years in this District and as a Mainlatder of the Talaka for two years and as an owner of loud inigated by caual water and well water in Gokak Taluka, I have had the opportunity of making myself acquainted with the subject and the taluka.
- 2. The average minfall for the past five years as compared with that for five years previous to them is given in the subjoined table:—

M	euth.			from	e rainfall 1892 to 696.	Average rainfal from 1897 to 1901.		
				In,	cents.	In.	cents.	
Jaquary								
February			•			0	19	
Maroh	•			0	50	0	41	
April				0	88	1	67	
May .	•			1	37	l	23	
June .				1	55	3	G3	
July .	•			3	39	1	9	
August	•			3	48	3 1 1	20	
Soptember				1 3 3 4	96	8	33	
October				4	10	8	38	
November				1	12	0	92	
December	•	٠	•			0	1	
	Тота	AL.	٠,	21	8G	23	34	

- 3. (1) The total area of the taluka is 520½ square miles and the total population occording to eccase of the current year is 63,615 as compared with the cenase population of 102,594 for the year 1891. Owing to series of drongbts for the lest five years many have emigrated to the Nizam'e territory. Some have roturned after the census and all the remaining persons will return if the prospects of the season promise to be good. The propolation consists more of agriculturists than other classes. I do not therefore think that the agricaltural population is sparse in the taluka.

  (2) Thore are 12.654 heads of planch cattle in the current.
- (2) There are 12,654 heads of plough cattle in the current year as compared with the number of 20,057 in the year 1895-96. The decreose is due to series of droughts from 1896-97. The cultivable area for the last year was 288,142 acree and the area cultivated 238,466. The ratio of cattle to accompany the last year was 238,142 acree and the area cultivated 238,456. The ratio of cattle to acreage of caltivated area comes to two bullooks for every 36 acres. The namber of plough cattle required for black soil is less than the number required for other classes of soil. Ordineitly two bullooks are sufficient to caltivate 32 acres of black soil and 20 acres of red soil. There are two classes of irrigation, one by drawing water from a well and the other by the flow-water of a canal. In the latter case no bullooks are required to draw water, but two ballooks are sufficient to oultivate 12 acres of irrigated land; while in the former two bullooks are required for every two ocres to draw water and oultivate. The area irrigated by well will be far too limited as compared with the area irrigated by canal water. This will show that the present stock of eattle is insufficient. However, this will

readily be incressed if the prospects of the seasons be good for four or five years and the good prospects of irrigotion he held out to cultivators to hoot.

- (3) The black soil being generally fertile (the taluka being almost of black soil) it can grow dry crops without manare. The censars of all sorts of cattle for the current year is 35,376, and other animals amount to 30,800. It is roughly estimated that each cattle will yield five cart-leads roughly estimated that each cattle will yield five cart-leads of maanre. Each irrigated aere will require about 50 carts leads of manure. The present produce of manure will on this whole be sufficient for 5,000 aeres of irrigated land. The total irrigated area at present is only 554 aeres in the taluka. Bone manure and oil-cake manure is not used in this part of the country. When once canal is introduced this manure too will he mode use of. So it will be seen that there will not be insufficiency of manure.
- (4). The block soil is not unsnitable to irrigation. (4). The block soil is not unsuitable to irrigation. I can say from personal experience without any fear of contradiction that the soil under the command of Gokák Ghataprabha canal in Belgaum District and the Hongal-Dharma canal and the Mudag and Dumbal Tauk counts in Dhárwár District is all black. Rice, maize, sugarcane, chillies, rod potatoce, brinjals, garlio, betol-leaves, onions, and torts of vegetables, the fruit trees, such as plautain, grayus, lemons and coccasant trees are grown in abundance. guavas, lemons and eccoan at trees are grown in obundance in black soil. Mango, apple and other frait trees which are poenliar to the red soil are not grown in the black
- (6) Certainly more capital is required for irrigated crops, both for initial and annual expenditure than for dry crop. I estimate annual expenditure to be Rs. 75 per acre in the case of oanal water. The oultirator will manage somehow to bear this expenditure with the sanguine expectation that the outturn of crops will far outweigh the annual outlay.
- (7) I do not think that onlivators will shirk from making use of frigational advantage for fear of enhanced rate, rout, or revenue assessment, because the water-rate will be quite commensurate with the additional profit they receive from the irrigated orops.
- (8) The present tenure under the Land Rerenuo Code does not seem to throw ony obeloole in the way of extension of irrigation. But the restricted tenure proposed under the Amendment Act of Land Revenue Code is a great impediment not only to the irrigational improvement, but to all other land improvements. The present Tenancy Law does not oreste any obstacle to the irrigational improvement.
- (9) There are no other reasons against the irrigational
- 4. My office record does not show that any exemption to menhanced assessment for any particular period has been allowed. All I can say from my records is that no enhanced assessment has been levied from Motasthal irrigated land. All Patasthal irrigated land has been levied with the consolidated assessment (Infid assessment together with water-rate). The present provisious are sufficiently liberal, and I do not think any alteration in the existing law is called for.
- 5. No. Not as freely for irrigational work so they take for removing weed or throwing an embaukment. Firstly, because the well work is much more costly than the sum of become the well work is much more costly than the sum of taged they reesive in proportion to the scearity of the land they are able to offer; recordly, on account of the ancertainty of finding water at a reasonable depth. The only practical suggestion I can offer in the way of encouraging the application for loans for the extension of irrigation is the making of trial borings for the people as pointed out in paragraph 38 below. The terms of tagái advance for irrigation should also he made more liberal ond cuticing,
  - (1) Reduction of interest from Rs. 5 to 3 per ceut. per.
  - (2) Remission of interest for the first two years.
  - (3) No partial remission of advance is necessary.
  - (4) No total remission need be granted when trial boring is resorted to as explained in paragraph No. 38 below.
  - (5) The maximum period of repayment allowed under the present rule is 20 years. This period is sofficiently long. But in practice the period allowed doss not exceed ten years. If the maximum period he brought into practice, the present period need not be extended.
- 6. No. Certainly not. When I discussed with the intelligent rayats in my taluka on irrigational motter, they expressed their unbounded joy to see that Government were contemploting some scheme for the extension of irrigation.

B .- CANALS OF CONTINUOUS FLOW.

There are no irrigational canals of this class in this taluka.

#### C .- CANALS OF INTERMITTENT FLOW.

- 12. (1) There are a couple of nalas in this taluka the banks of which are not steep. People dig out a small channel of 3 feet width and 2 feet depth from the higher level of the bed of the nala down to a bank, the level of which corresponds with that of the fountain, and the channel is then load to pass Jewawards through the lead by the side of the bank, as will be seen from the following hand sketch.
- (2) Water in the channel constantly runs about a foot high and is used by the adjoining land-owners in turn amicably settled long before. But the area thus irrigated is very small. The total area irrigated by this process amounts to only 168 acres and 85 gunthas in this taluka.
  - (3) The supply is ordinarily maintained-
    - (a) for six months in a year of ample rainfall ;
    - (b) for four months in a year of scanty rainfall;
    - (c) in a year of drought the supply of water falls too short to raise any crop.
- 13. (a) The supply is not sufficient to grow two crops in a year.
- (b) More valuable crops are grown, such as rice, chillies, red potators and onions, etc. This is generally the hot weather erop. In the monsoon no such erop is grown. The value of the outturn of this erop is estimated to be double that of the dry erop, but it enthils more cost and labour.
- (c) The yield is considered to increase in the case of scanty rainfall compared with the yield of dry erop land. This increase may be said to be double. But in a year of ample rainfall and in a year of stronght no distinction can be made in the yield of this land and the other dry erop land.
- 14. As no irrigated crop is grown in the mensoon there is no necessity to rouly to this question—(1) and (2).
  - 15. No.
- 16. The increase in the total annual value of the produce per acre due to irrigation may be estimated—
  - (1) at Rs. 5 on the average of normal term of years.
  - (2) nothing in a year of drought.
  - The approximate annual rate per nore is as under:—
     Nit.
    - (2) Rs. 2-8-0 in the case of rice land and Rs. 3-8-0 in the case of garden land on the area netually irrigated. But this late varies according to the prospects of the season.
    - (3) Rs. 1-8-0 in the case of rice land and Rs. 2-3-0 in the case of garden land on the whole brigable area.
    - (4) Nil.
- 18. I cannot give what the initial exponditure for constructing this channel would have been, because the channel is said to have been constructed before the introduction of revenue survey.
- 19. No damage has resulted to the people, but the soil is some to be deteriorated from Irrigation without manufe. The supply of water from this channel being hardly sufficient to raise one crop only, there is no danger to the land from the salt efflorescence. Irrigated hand adjacent to a big tank is found to suffer from salt efflorescence owing to water-legging, as I have seen in the case of lands close to the old irrigation tank at Asaadi in Rauebenuar Talukn of the Dharwar District.
- 20. The channel running through the best of the mala which is generally five or six furlange long, requires to be cleared almost every munth and that passing through the land once or twice a year. These requires are done jointly by all the cultivators of the fields brighted by the channel. I cannot therefore give the cost of the repairs. This system works well and no legislation is necessary.
- 21. These channels are said to have been constructed by private persons. The channel running from the bank to the irrigated hand passes through some other lands which are not benefitd by the irrigation. Some trouble might have a isen in the beginning in permitting the channels to pass through those lands, and the owner of the channel might have very likely bought the consent of the owners of those lands. As the area of the channel has been deducted

from the area of the field assessed at the time of the rerenue survey no trouble appears to here arisen to the owners of those lands, nor to the realization of dues from them. There is no necessity for Government to take over the menagement of these canals.

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22. I consider it advisable to enconrage and assist the construction by private persons wherever possible, although I know that the water-supply is not so ample as in past years. The main difficulty for private persons in undertaking the work is to obtain the consont of the owners of the fields through which the channel is required to pass. This difficulty can only be obviated by nequiring for the applicants the strip of land required for the channel under the Land Acquisition Act.

#### D .- TANKS.

There are no tanks irrigating the lands in this taluks.

#### E -WRLLS.

- 34 The taluka is divided into two main tracts, (1) black soil and (2) red soil.
  - (1) The average depth of permanent wells is 40 feet in black soil and 30 in red soil.
  - (2) The supply of water in both the soils is generally from springs and in a few wells which are just on the banks of nales from percolation. The supply is not likely to fail in an ordinary year, but it does fail to some extent in a year of drought.
  - (3) The cost of construction varies according to the nature of the sub-soll and the proximity of building stones. On an average the well costs about Rs. 800 in black soil and Rs. 600 in red soil.
  - (4) If the building be strong and the well circular, it can last for any length of time provided occasion at repairs are done to it whonever required.
  - (5) By a mot with two or four bullocks. If the supply of water is abundant and the area to be irrigated is more than two acres, more than one mot is used for one and the same well.
  - (6 and 7) The area commanded by a well depends upon the quantity of water in it. If the supply is abundant three mots are used and the maximum area irrigated by three mots is not more than six acros. Two acres are ordinarily irrinted by a well of a single mot in one year with one pair of bulle ks.
- 85. The irrigation increases the value of the produce by double-
  - (1) By rendering it possible to cultivate two harvests in one year.
  - (2) I'y substitution of more for less valoable crops.
  - (8) The yield does not increase in a year of ample ininfall, but it decreases to a small extent; while in a year of scanty rainfall and in a year of draught the yield necessarily ircreases if compared with the dry orop land, which yields nothing in that year.
- 36. The increase in the total annual value of the preduce per acre due to brigation is estimated to be its. 3 both in a year of drought as well as in a normal year.
- 37. (1) As a role the tonant of garden land pays to the owner some share of the gross produce of land. This share depends upon the fertility of the land, the sneply of water and the competition of the tenants. The share varies from 4th to 4rd of the produce. The value too depends upon the variety of crop grown. On an average the tenant pays to the owner per acre one ropes more than he would have paid for dry crap land on the area actually Inigated.
- (2) No extra assessment or water-rate is paid on account of irrigation by the owner to Government.
- 39. (1) No difficulties are experienced in the case of lands on the banks of nalas, but in other lands difficulties are encountered in the selection of site.
- (2) If the bod of the well consists of hard muram or stene no difficulties are experienced in the construction of the well, but so ions difficulties are encountered if the bed consists of sandy land or mud. These difficulties are often experience of the superstructure. This construction is more expensive and is likely to give way after some years.

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No ossistance has been given by Government in the shape of expert advice or trial horing, etc. Iudeed, euch assistance is very useful. There are three Circle Inspectors in this taluka. A boring tool should be kept with each Circle Inspector, who should be taught how to moke trial borings, and he should be instructed to make the trial borings in any villoge at the instance of the Mamlatdar. The Mamlatdar of the taluka should receive applications, and if he be satisfied after enquiry that the applicant is able to undertake the well work and to pay the expenses of the boring if the water is faund, he may issue orders to the Circle Inspector to try it. Assistance should also be given Circle Inepector to try it. Assistance should also be given in the shape of export advice. I would suggest that the nu the shape of expert advice. I would suggest that the experts should visit each thluka every year in the sommer and eacamp in three or four villages in different parts of the tatuka to give to those applying for it their advice in the selection of sitee and construction of wells. One mouth's notice of the date and place of their camp should be given so that people may avail themselves of the valuable advice of the experts.

- 39. I um not in favoor of constracting wells in private lands at Government expense, because there is no generantee that the cultivator will utilize the well water for irrigation, and if at all he uses it no extra rate can be levied from him sufficient to cover the ordinary interest on the amount spent by Government in the construction of well; and if by Government in the construction of well; and if the expenses were to be recovered from the cultivator he would not pay it, because he always considers that the work constructed by Government agency is more costly than that constructed by himself.
- 40. Tomporary wells have begun to be more commonly used only in the year of drought than in ordinary years. Bot the area irrigated by lift water does not exceed helf an not the arch irrigated by a mot does not exceed hair an acro and that irrigated by a mot does not exceed one acro or two at the most. Generally water juari is grown in order that it should afford fodder for cattle and grain for the cultivator to last for two or three menths. The grant of tagai alvances is u sufficient encouragement. No other inducement seems to be necessary.
- 1. Q. (The President).—I believe you are Mumlotdar of Hungand in the Bijapur District; how long have you been there?—Two-and-o-half years.
- 2. Q. Where were you before that?—Before that I was District Inspector of Agriculture in this district.
- 3. Q. You are a land-owner in the Belgaum District; have you a large estate?—Yes, I own about 300 acres in the Gokak Talnka.
- 4. Q. You say in the first poragraph of your note:—"But useries of failures of crops since the great and memorable famine of 1877 has etimulated the onlitivators to devise nud earry out all possible agricultural improvements and the couversion of dry crop into garden erop land is considered to be the best and safest improvement" then you go on to say "there will certainly be as much demand for irrigation is block soil and the construction of tanks for block sails. blook soil and the construction of tanks for block soil is considered as remunorative and as important as for other classes of soil." We have heard the opposite view from most people, who say blook cotton soil will not take water. In the Machadi tank there is water, but the people will not take it?—Black cotton soil if irrigated is profitable.
- 5. Q. You can no doubt give ue the names of places where black soil is irrigated?—I myself have lands with wells in pure black soil, and we get a much better garden crup from them by irrigation. We give black soil water regularly.
- 6. Q. How deep is the block soil ?-The depth is 1 to 13
- 7. Q. What is below that ?-Muiam.
- Which are mostly black soil under the command of the Go-kak Ghotoprabha canal will bear me out. I may also add that a greater area of irrigated land under the command of Alagad tank in Kod Tsluka and Dharma canal in Hangal Taluka in the Dharwar Collectorate is black sil." Do you think, from your experience that in ordinary years the people would take water in these soils if a conol was opened there?—People will take water for such soils if supplied by canals. The lands under the Gokok canal have such, and the water bas been used for percunial crops.

  9. Q. Do you say as contains.
- 9. Q. Do you say so, certainly it is a vory important point?—Yes, in these two cannis the whole area is block cotton soil and the people use the water, and pay the percu-
- 10. Q. How many years have they used it?-Ever since its construction.
- 11. Q. In your taluka are there many old welle which have not been used recently?—No pakka wells have been left naused in Hungund but kachcha wells have been left uaueed. It is only in famine years that kachcha wells are each for drinking water and for watering eattle.
- 12. Q. You say in parograph 7 "the only practical indacement I can suggest is to make the (takavi) advance without interest." Now, the Government interest is 5 per cont, what does the sowear take?—The sowear demands 12 per cent. and more.
- 13. Q. And yet they sometimes go to the sowear to borrow money to build wells !—The cultivators do not go to the cowear to borrow money for wells but for marriages and other purposes.
- 14. Q. Do you think that if Government reduced the rate below 5 per cent. it would be an extra inducement?—As

- an inducement for the countraction of wells I would suggest 3 por cont., or crea less, but the ratu of interest is already low compared with what the sowcare charge.
- 15. Q. Did many people come to you to ask for takani advances?—Yes, many people took advances.
- 16. Q. How much do you generally give of what is asked?

  —I generally look to the seemity he offers. If his land is worth its 200 and he wante Rs. 300 be would not get it. I would not give advances of not more than the value of the land offered as security.
- 17. Q. But if the applicant had plenty of land would you give him the whole of the sum he applies for?—It depends on the orders of the Collector, he sometimes gives orders to give large sams to selected land-owners. In the famine of 1897 the Collector issued orders to the effect that the mancy was to be given out in small instalments so as to give help to the greatest number of people.
- 18. Q. Was that a good policy?-That was a good policy for that particular time
- 10. Q. Wo heard to-day from a witness that if n man who wanted Rs. 500 get only Rs. 250 and he could not raise any more money after the well was taken in hand, that it would remain unfinished?—Yc-, lu some esses wells are left unfinished, but if there is plenty of water the money can be raised from the sowcars or by the sa'e of the crops which the trust mines. the myot mises.
- 20. Q (Alr. Ibbeison.)—I think you said just now that the caltivator never goes to the sower for more to boild wells?—Yes, but if the well is a good one the sower can be got to load money on the security of it.
- 21. Q. (The President.)—Do you think that the best means to induce the extension of wells would be to lower the Interest?—Yes, lower the interest and extend the period of repayment to 20 years.
- 22. Q. But the law allows 20 years?—Yes, that is the law, but that is not the practice.
- 23. Q. Do you find complaints made about the time it takes to get a fakaci advance?—In famino times no delay takes place as a summary process is edopted. In ordinary times the rayat does not care about the delay as he can earry out his improvements in the following season.
- 24. Q. Sopposing that if instead of asking for ropsyment of the advance Government were to assess the land at wet rate, would that be popular or would it not?—It would not be advisable. We would he doubling the assessment. A man would cultivate the land for some years and when it gave out he would allow it to lie follow, and it would be religiously and adventure and would not come forward to relinquished and other people would not come forward to cultivate it.
- 25. Q. The Government would lay on the assessment all the same?—Yes, but the man would relinquish the load.
- 26. Q. What do you think the best thing Government can do for your tslake to enable it to withstand famine?—At Balkundi on the borders of the Nizam's territories there is a nala and I think a good reservoir could be constructed
- 27. Q. You say in your note that your proposal on the enbject would be submitted in a month, have you enbmitted it?—No, I was told that it had already been sobmitted.
- 28. Q. (Mr. Rajaratna Mdlr.)—Was not the scheme said to threaten the submersion of Itkul towa?—No, it was thought likely to submerge Balkundi village.

- My. Beale.—Explained that the witness was referring to the Itkal project which had been unfavourably reported on by Mr. Joyner and condemned by Government.
- 20. Q. Witness.—There are two rivers in my taluka, the Malprahhn and Krishna; on the former I think a dam like that at Gokak might be made.
  - 30. Q. Are there any small tanks in your taluka ?-No-
- 91. Q. Would you advocate the construction of tanks ?—. There are no places suitable for tanks, but many wells could be constructed alongside the nalas.
- . 32. Q. Have the people been constructing many wells lately P—Yes, 178 wells have been made since 1896-07. Some are kacheha, some are pakka; they will all be made pakka as funds permit.
- 39. Q. I see according to the last Census that your population has gone down from 1,02,894 in 1891 to 88,615 P
- 34. Q. Were there a great many deaths or was it due to emigration?—The decrease of population was due to (1) more deaths than births, and (2) emigration to the Nizam's territories.
- 35. Q. Were they better off there? Yes, last year there was a better erop on the borders and the people who erossed over got better wages—they got enough wage in one day to keep them for two in food. There was no fumine in those parts. Most of those who migrated have now returned.
- 56. Q. Has this reduction in the population been only since hat your?—No, the reduction has occurred since the 1897 famine, several people who omigrated to the Nizam's dominions became well off and remained there.
- 37. Q. Did none of the Nizam's subjects come over into British territory ?—No.
- 38. Q. (Mr. Hobitsen:)—It is very common to have emigration in both directions?—None of the Nizam's people come into British territory in our district.
- 39. Q. (The President.)—In paragraph 19 of your printed noto you say—"No damage has resulted to the people, but the soil is euro to be deterlerated from irrigation without manure \*\* irrigated land a liacout to a big canal is found to suffer from salt efflorescence." What do you put the salt down to; do you think it is due to the absence of manure?—Salt efflorescence is due to pleatiful rain and long irrigation. If the rain fall is only sufficient there is no danger of salt efflorescence. You will not find lands irrigated from wells suffering from salt efflorescence. The only lands that suffer are those which get more water than is good for them.
- 40. Q. The best cure would be to drain the land, would it not?—Yes.
- 41. Q. Do you think the extensive use of manure would cure it?—The use of more manure would remedy it. If you irrigate without using manure the laud deteriorates.
- 42. Q. Have you over seen drains n ale to carry it off?
  —I have not seen any drains in this district.
- 43. Q. (Mr. Higham.)—You say that in black soil you can cultivate sugarcane; would you also enlivate rice?—Rice is not grown so much as sugarcane and garden crops.
  - 44. Q. Is whoat grown P-Yes, wheat is grown.
- 46. Q. Supposing Government were to make a large number of irrigation works in this black soil, would there be any demand for water except for cane or other high class crope?—The people do not grow sugareane alone; they grow maize, wheat, juari, plantains and vegetables.
- 46. Q. Up to what percentage would they grow cane?—Not more than 10% of angarcane. If the land is irrigated by a canal they grow more maire and vegetables than augnitions, as sugarcane requires watering to a greater extent than the other crops and is therefore more expensive.
- 47. Q. What about maize !- Maize is grown on all irrigated laudr.
  - 48. Q. When does it want water ?-Once in eight days.
- 49. Q. For how long?—It is harvested in three or four months. Three crops can be raised in one year. It is not a very profitable crop. Only one crup of sugarcane can be raised in a year, but it gives a good profit.
- 50. Q. Is the quantity of maize grown very large? I thought that in the Decean the quantity was not large?—As large as possible on the Gokak canal and any other tank irrigated lands,

- 51. Q. Why don't they grow it under wells?—The area of maize grown under wells is small as the water is used for angarcane.
- 52. Q. If canals were made all over the country, do you think there would be a general tendency to grow maize f
- 53. Q. They would not pay a higher rate?—At present on the tickak canal the water-rate is Rs. 2 for the first crop and Rs. 2-8 for the second crop.
- 54. Q. Why a higher rate for the second crop?—Because it is raised in the hot season and water is more valuable. Rupees 20 is the price fixed per acre for sugarcano.
- 55. Q. Do they never grow wheat ?-Yos, they irrigate wheat, cotton and jauri from the wolls.
- 56. Q. We were told that cotton requires no water ?— They irrigate cotton in Gokak in dry years.
  - 57. Q. Does it require water in ordinary years ?-No.
- 53. Q. You may that it costs Rs. 75 per acro to cultivate irrigated land?—Yes, evon in ordinary yours.
- 59. Q. What is the money spent on ?-It costs Rs. 40 for manure alons in lands through which canals run.
- 60. Q. Is that an anual odarge?— Ves, unless we put down 50 or 60 cart loads per acro, we cannot grow a good erop.
- 61. Q. Supposing you are grawing a crop of maize, would you put down Rs. 40 worth of manure?—In regard to maize we have two crops and each crop would require Rs. 25 to Rs. 30 worth of munure per acro.
  - 62. Q. In black soil ?-Yes.
- 63. Q. You say that where there is tank or canal irrigation there is salt offlerescence which you attribute to too much water, could not the supply of water be restricted in some way?—Yes, it can be ristricted but the poople make channels and lot the water on when they go home at night, and when they return in the morning the land is flooded.
- C1 Q. Supposing the supply of water was arbitrarily limited, they could not waste it then?—That would stop water being used in excess.
- 65. Q. Supposing you were to charge the people according to the quantity of water used and not according to the area irrigated so that if the people are careful of the water they would have to pay so much loss, would that have the effect of making them more careful?—I cannot say, but I know that a man, who is nort to the canal head, is charged for water wasted. He is sometimes prosecuted for wasting
- 60. Q. Does that not make him more careful?—He takes his chance. He is not generally caught as the waste occurs at night.
- 67. -Q. If he lets the water run to waste, you say he can be fined; who fines him f-1 fine him.
- 68. Q. How do you fine him, as a Magistrate or a Civil Officer?—As a Magistrate.
- 69. Q. I suppose as a general rule if a man wastes water the Irrigation Department do not ours to go to all the trouble necessary to presecute?—That is the ease, they only presecute when a man is persistently neglectful or obstinate.
- 70. Q. You say that the culturable area of your taluka is 255,000 acres, of which 238,000 is cultivated. What area is ordinarily harvested?—The cropped area is generally the same as the cultivated area, viz., 235,000.
- 71. Q. Is any of that protected by irrigation?-No, none of it.
- 72. Q. In a very dry year I suppose the whole area caltivated fails?—Sometimes in very dry years much of it fails. There are different kinds of soils. Soft black soil requires less rain than hard black soil. The latter requires very heavy rain. When once it is wet, it does not dry up oasily. If only a safficiency of rain fails, soft black soil gives a good crop. It is on account of these lands that the prophe saffer, for wheat is only obtainable on them when the rainfall is fall. Rod soil isnds yield some orep oven if the rainfall is scarty, but whom rain is plentiful they give less valuable crops than black soil.
- 73. Q. In 1800 what was the proportion of the culturable nies cropped?—Nearly the whole area was sown, but we bad ouly an all-round one-auna crop.
- 74. Q. Did many people go on reliof works ?—A few did, but most went to the Nizaur's State, because they could got remunerative labour there.

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- 75. Q. Why did they go to the Nizam'e territories, had you no relief works?—Wo had two relief warks in our taluks, bot the people preferred to omigrate, as in the Nizam's State the work was lighter and the wage better.
- 76. Q. Could they not live on what they got from their
- 77. Q. Snpposing come portion of the culturable area, sey 10 per cent., had here irrigated, would the awners and labourers of these lands have been protected?—Only four labourers can be occapied on one acre, and if you irrigate 10 per cent. it would anly protect the people living on that area, hat would not keep all of the people of the ather 90 per cent. from going on relief works.
- 78. Q. (The President.) -Is it not a enstom for several families to join together and work a well in a fumine year?

  No, it is not. But it is the custom for families to emigrate to ather coautries, buy some land for Rs. 50, paying say Rs. 10 euch, and maintain themselves on it hy sowing crops till the famine is over. Then they come back. In his own country each man looke to his own heuefit as a rale.
- his own country each man looke to his own hencest es a rale.

  79. Q (Mr. Higham.)—Take one owner only; supposing he cultivates 103 acres, only 10 acres of which are protected; has has a certain number of people living on his holding in ardinary years; drought occurs and he gets only a two-aana crop; would any af his people have to go ou relief?—The owner would employ as many only as are required to cultivate the 10 acres. The labourers turned off for the 90 dry acres would go on relief. It is only Desais and Deshpandes who wauld maintain their people whether they had a good crop or not on the understanding that the people will remain for 10 ar 15 years in their service.

  80 Q. Would they have to go on relief supposing half the
- 80. Q. Would they have to go on relief supposing half the area or 50 por cent. were irrigated? -No, if they gut sufficient to live on they would not go on relief work.
- 81. Q. What would you call harely sufficient ?—A four-na crop. They could easily maintain themselves on a
- 82. Q. (Mr. Ibbetson.)—You say that in the famine a summary procedure was followed lu giving out takavi, what was the main difference between the summary and the what was the main timerence between the summary and the ordinary procedure of lakavi wo dispense with the issue of uptices, we also dispense with the inspection of the land on which the improvements are to be carried out, we do not visit the land and value it, and to be carried out, we do not visit the land and value it, and we do not trouble to find out if the sowear has any lien or mortgage on it. We emply find out whether the land is sufficient searcity judging by assessment or hy enquiry from the paneb or village officers, who accompany the applicant. We make vivd voce enquiries. We generally calculate twenty times the assessment. Unless the land is garden land we can see from the late of assessment per acre what the value is. what the value is.
- 83. Q. Do you think that the Government ran much risk in lending under that procedure ?- No, I think the Government ran no risk.
- 84. Q. Do you think that that procedure could be followed as a critical state that the recedure could be followed in ordinary yours?—Yes, it might safely be followed. Lately u circular order has been issued to the offect that the Manulatdars are to be supplied with all information concerning the register of sales, mortgagos, etc., of lands.
- 85. Q. He will have to refer to the Registrar in future; you think that procedure can be eafely followed?—Yee, we had no meuns of escertaining before.
- 86. Q. You say that your talnka is not enitable for tanks, -Because my taluka is flat and tanks canuot be
- 87. Q. You say that many wolls made in 1896 97 and since were built kachcha and will be made pakka as funde permit, woold it he a good thing if Government could help the people to make them pakka?—Yes, it would he a good thing to help the people to make the wells pakha by the aid of takavi advances.
- 88. Q. If a well is once made you can safely advance more money to make at pakka, as its construction has made the land more valuable. If we after more money naw on favourable terms, would the rayat accept it?—Yes, but sometimes a able terms, would the rayar accept it?—Les, but sometimes a man who bos 5 acres builds a well und the well does not stand, and it has to be built af stone. In my taluku stone is not available and the construction of u well with stone and mortar costs a considerable sum. The man would have to spead more money thus the land is worth. In such a case we could not advance more.
- 89. Q Supposing Govornment was willing to take the risk. Soy a man had epent Rs. 300 on u kackoha well and he wanted Rs. 400 more to make it pakka though his land was

- worth only Ra 500, do you not think that Government might not make the advence; would there not he honest men , who would come to take the men y and ropay it?—It is difficult to discern honest men from athers. I think there would be great risk in giving edvances af some above the value of the land.
- 90. Q. Do you thick there would be any great risk; of coarse there would be risk; but you say Government might lend a good deal for the construction of wells; would it not be worth Government's while to run u little further risk to have the wells made pakka?—I cannot say one way or the ather.
- 91. Q. In your printed note you say that laud deteriorates unless well manured, do you speak from experience?—Yes.
- 92. Q. Do you refer to canal irrigation ?- I have irrigated land from the Gokak canal, from wells and from the unlialis.
- 93. Q. Did you not use enough of menure?—I knaw that the laud deteriorates unless menured; so I ulways nae manure. These who do not do so, do not get such good crops as mino.
- 94. Q. It is not a question of crop it lis a question of soil, why do you say the land cannot be irrigated without heing manored?—I let some of my lands ut times and the tenunts put manure on it for two or three yeare and get good crops; in the year in which the lense expires they do not manure the land, and an inferior crop is the result. They do this in order so that I shall not get the benefit of his manure.
- 95. Q. And vory sensible men too. I understand that the crops will full aff if the munure is not renewed. That is all you mean by land deteriorating without manure?—Yes.
- 96. Q. (Mr. Higham.)—Sopposing a piece of laud will give a certain yield without manure, will it yield less than that if you go on irrigating without using manure?—The land will yield less and less unless manured. If irrigated by n well n crop could be got with very little manure for two or three years, but after that more manure will be required.
- 97. Q. (Mr. 1 Ibbe'son.)—Can you grow rabi crops in our taluka without irrigation in ordinary years?—Tho rabi erops ure irrigated.
- 98. Q. In black soil do the people water juari?—Yes, but it is not a paying orop, except when used for fodder in had years.
- 99. Q. Would they irrigate wheat in a good year?-
- 100. Q Is all the water of the Gokuk caual used every year?—Yes, there is always a greater demand than it can meet.
- 101. Q. Does it never run dry?-Last year, or the year before it ran dry for the first time since 1896-27.
- 102. Q. (The President.)—Does the Gokak anal come into Bijapur?—No, it does not come into Bijapur, but the Superintending Engineer says the canal could be brought into Bijapur were it not that it would buve to come through the Nutive States of Mudhol and Jamkhandi.
- 103. Q. (Mr. Ibbetson).—Did the water-supply in the wells fall in 1896-07?—No, but there was a deficiency.
  104. Q. Yon had good rains in 1898-99, how did they behave in 1899-1900. Did they fail?—They did not fail mach in 1899-1900. In 1900-1901 was the crisis.
- 105. Q. Last year when they were at their worst, what proportion of the normal area did they irrigate?—Not more than one-fourth. They did well for the first year, pretty well in the eccond and failed in the third.
- 106. Q. You etuto that the dspth of the black soil in your taluka is three feet. What is there underneath it?-Muram or enud.
- 107. Q. Yon propose that in giving takavi we should remit the interest for first two years; when is the first instalment takeu?—Twelve months after the money is advauced.
- 108. Q. How long does a man toke to make u well?—It takes a long time, as the cultivator must wait for the hot weather to test the supply before huilding the well. Only ufter he is satisfied does the cultivator construct the well finally. It takes mother year for him to lovel his land fically. It takes und altogether two years.
- 109. Q. He trice it first as a kacheha well ?-
- 110. Q. Then you hegin to recover before the well is ready to be worked ? Yes.
- 111. Q Do you think that wise ?—No. The first re-covery might be made later—after two years.
- 112 Q. Is any rice grown in your taluka?-Oo'y a small quantity.

113. Q. Speaking of channels from the uallahs, you say that it would be o good thing to encoorage the people to make them; but that there is the difficulty of baving to take them across other people's lands. If that difficulty could be overcome would the digging of channels be taken up?—Thore are some people who would do so.

114. Q. Have you ever been osked by the people to take up land for this purpose?—No.

115. Q. If they dig channels whot would they bave to pay for the water?—If the water is perennial the rate will be Rs. 4 or lts. 5, if it is only monsoon water the rate will be Rs. 3.

be Rs. 3.

116. Q. Supposing Government were to say this is an insecure tract, the water is running to waste, we want to get the water used and we will give the water for nothing; would many of the people take it on these terms?—Yes, if there were no charge for water; mony people would very willingly make channels. muke channels

117. Q. Is there a good doal of room for that kied of work in your talaka?—Yes, u good deal could be done.

118. Q. What area could be irrigated if that were doac?

—Ahout 100 to 200 acres could be irrigated—there are only

two nallahs.

119. Q. In your note you say:—"The increase in the total value of the produce per core due to irrigation is estimated to be Rs. 3, both in a year of drought as well os in a normal year," Rs. 3 must surely be a misprint, ought not the figure to be more than that !—I would like to referred the opicional its must be Rs. 19. refer to the original, it must be Rs. 18.

refer to the original, it must be Rs. 18.

120. Q. Supposing one man has on acro of dry crop and onother has o well and grows an acro of vegetable, would not the difference be more than Rs. 13 per acro?—As regards my own land irrigated by the Gokak canal I can say. If I sow sugarance I should have to spend Rs. 150 and would get Rs. 100 profit, if I sow other crops such as moize, etc., I should get Rs. 50.

121. Q. Sapposing you had no irrigation?—In that caso

121. Q. Sapposing you had no irrigation?—In that ease on the same land T would get Rs. 10 to Rs. 25, 122. Q. (Mr. Mair-Mackenzie).—Have you had any experience of tals on your lands?—Yes there are tals on my land.

123. Q. Do you think there is much scope in your talaka for work of this kind?—Every cultivator with means makes tals. I am sure if cultivators bad the money they would do eo.

124. Q. Have you ever given takavi for tale?—Yes.
125. Q. In some parts of Bijapur tale are preferable to wells, are they not?—Yes, I know that in one case Rs. 1,000 to Rs. 1,500 has been spont in a tale and spent profitably.
126. Q. Are not tale faced with stone?—No stones are

required, stones are only used or required when making sluices for big tals.

127. Q. Have you not seen the onds of the terraces mode with stone?—No, but the waste weir might with advantage

be made of stone.

128. Q. Have you not seen big tāts made of stone work?—No.

werk?—No.

129. Q. You say that in some parts of the district they ore more effective than wells?—Yes, when talls are put across a unlish they must leave it for three or four years before being used to allow the land silt up. After three or four years rice could be grown.

180. Q. Iu your taluka they don't grow rice?—Yes, they

do.
181. Q. And juari?—Rice is more profitable than juari.
182. Q. You mean that for two or three years you will grow juari under the tall your ultimate aim hoing to grow rice?—Yes.

rice f-Yes.

133. Q. Woald lands under a tāl produce goed erops in a famine year ?—Yes, they would produce goed erops even in a year of famine when other lands would not be yielding a crop. Three years ego I put up a tāl aod it was washed oway but I repaired. There was o failure last year, but the four acres which bad the advantage of the occumulation of water under the tāl yielded a first class crop.

131. Q. (Mr. Rujaratna Mdlr).—In this tāl land if you grow paddy, is the assessurent enhanced?—No, it will not be enhanced till the next revenue settloment.

135. Q. Chu the classification of the seil be altered?—

195 Q. Can the classification of the seil be altered?— The classification can be altered, but it is not altered if the improvements are made by owners at their own cost.

WITNESS No. 72 .- MR. IBRAHIM AHMADI, L.C.E., F.R.I.B.A., Executive Engineer, Bijapur District.

Answers to printed memo. of questions.

## I. Para. 3 of Memo.

Experience as regards black soil.—Small tanks constructed in black soil do hold water. Only small dams of about 12 feet high or a little over can be made of black soil without massnry core walls, provided the top and outer slopes are protected by muaum and the inner by pitching. In the second class tanks in this district water is being withing correct or a process rainfall gapagethy. utilised even during seasons of average rainfoll generally for tice and vegetable. I have no information avoilable for the next sentence. I believe there is a desire for irrigation works in black soil, and construction of tanks in such soils would be us remunerative as for other classes of soil.

## 2. Para. 4 of Memo.

Description of existing Government irrigation works.—There is one first class tank, viz., the Muchkundi Tank and 16 second class tunks in this district, the irrigoting capacity of which and range of variation together with all other information for these as well as for works proposed have been collected by Mr. Beale, the Superintending Engineer on special duty, and all questions on these points will be answered by him. None of these works can be de-- pended on in a season of drought.

## 3. Para. 9 of Meme.

Classification of works on which relief labour was employed in this district during the famine of 1899-1900, 1900-1901 and the current year and the amount expended on each class :

4	AMOUNT EXPENDED.								
Class of work.	1899-1900.	1900-1901.	1901-1902 up to the end of Sep- tember 1901.						
Roads Notal-breaking Irrigation work	Rs. 33,460 -26,725	Rs. 64,378 2,19,855	Re. 93,890 33,104 1,66,987						

A small amount was also spont by the Civil Department on village tanks end by the Bijopur Mnaicipality in clearing out wells in the tewn.

Works uncompleted at end of famine.—As regards roads constructed during famine, no forther expenditure in completing them used he incurred. Excepting where pakka cross drainage works are necessary, the reads are finished in all respects. Portious of the roads not touched are not of sufficient importance to warrant further expenditure from Previncial or Imperial Funds. As regards irrigation works, all information required in this paragraph will be submitted by Mr. Beale. submitted by Mr. Bcale.

## 4. Para. 12 of Memo.

Statistical information for the Muchkundi Tank :-

## I .- Initial Statistics.

Area and nature of oatchment-26 square miles, partly hilly and partly black seil.

Assumed overage rainfall-23.50 inches.

Full supply capacity of tank in million c. ft.-624.

(The capacity originally proposed was 302 million c. ft., the present increuse being due to the dam having been made tee high for reasons of construction.)

Percentage of capacity on assumed average minfall—42.32. (Originally proposed—21.18.)

Water spread at full supply-44-18 million sq. ft. Maximum height und total length of dam :-

> Height 60 ft. 421 ft. Leagth

Cost of-

Rs. Dam 67,014 Waste weir 5.105 2,172 Sluices Compensation for land submerged by 13,478 tank Cost of canal and distributing channels. 18.874 Total capital cost 1,58,707

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II.-Annual statistics for each year for the Muchkundi since completion.

Year.	Bainfall,	Amount stored in million cubic feet.	Amount run over waste	Total run-off, million oubic	Percentage of ran-off to rainfall.	Area irrigated in sores.	Quantity of water left in tank at end of irrigat- ing season and available for next year.
1886-1887	25·28 23·97 22·98 21·93 20·67 11·68 85·97 27·32 20·76 697 23·28 23·23 20·22	12:452 31:771 39:710 103:003 60:367 15:72 26:56 283:95 201:72 12:164 16:90 119:03 114:54 171:72 133:59	Nil.	168*41 170*02 146*11 232*12 232*12 247*78 151*26 <i>Wil.</i> 219*47 193 80 281*95 147*97	11 12 10 18 10 11 21 21 21 8 Nil.	382211 20531290 1054 6177	Nit. Nit. 5'86 69'93 7'93 55'03 223'73 104'15 117 72 30'16 70'43 60'03 60'03 122'30

All available initial statistics for new projects will be submitted by Mr. Boale.

- 1. Q. (The President).—You ore Excentive Engineer, Bijapur ?—Yes,
- 2. Q. How long hove you been here?—For four years. I have all the local works in my charge.
- 3. Q. I suppose that there is so little irrigation in tho district that you have not hestowed much attention to the sahject of irrigation?—That is so.
- 4. Q. You have the Muchkundi and Sangegi works under your care?—Yes; I am looking after them, the latter is a famins work and is under coostraction.
- 5. Q. You have heard wont the last witness said about hlack cotton soil taking irrigation feeely is that your experience ?—I cannot say; I have no experience.
- 6. Q. Why is the Muchknodi tank not doing better?— The dam is too high and it never fills. People wont a guarantee that they will be given a sufficient and permanent supply.
- 7. Q. The people don't ask for that gnarantee elsewhere P-No.
- 8. Q. Is the tank badly made?-No, the tonk is well made.
- 9. Q. Is all the available water used ?-No, the water is not all used.
- 10. Q. (Mr. Ibbetson).—Not even in a famiue year ?—No, not even in a famiao year.
- 11. Q. (The President) .- What is the cause !- The excuse is that they are not suro of getting water always.
- 12. Q. (Mr. Higham).—Why should they not irrigate rab; they would know how much water there was at the end of the rains?—I do not know why they do not do
- 13. Q. (The President).—What do they grow ?—Sugarone and garden crops.
- 14. Q. Do you not think there must be some reason heyond that which you have given; are the rates too high?—I have never heard any complaint about the rates high?—I h
- 15. Q. When was this tank finished ?-It was finished before I came here.
- 16. Q. (Mr. Ibbelson).- Is the water rate for rabi crops prohibitive?—No; but some two years ago I went to Bagal-ket and had a conference with the enlitimtors when they demanded a guarantee are also made a proposal which I have montioned in my note in Mr Bealo's book. They said also that they feared that the rerenue would be inoreosed if they irrigated high class crops.
- 17. Q. (The President).—Don't you think there must be something in the back ground that we do not knew about f-l cannot say.

#### 5. Para. 13 of Memo.

Scale of water-rates.—On Mnohknudi Tank, which is a minor work the charges ere Rs. 8 for perennial, Rs. 4 for eight menths, Rs. 2 for four months, Re. 1 for mensoon dry and Rs. 4 for special hot weather crop per acre. Application for water is received during the whole year. There is very little irrigation under this tank. A knrkun, who is paid Rs. 5 per menth for the work, looks to the distributioe. During years of favoorable rainfall there has been less demand for irrigation under the Muchkandi Tank. Second class tanks ore always empty at the end of irrigating season, i.s., in hot weather. The only new tank constructed during recent years is the Mnohkandi Tank, the irrigation from which has hardly affected the revenue derived from lands under it. Maintenance charges for Mnehkundi from lands under it. Maiatenance charges for Muchkundi Touk are fair. As regards second class tanks, they are only repaired if the rayats contribute 10 per cont. of the cost. The maintenance charges for these tenks are also fair. No rovenue accounts are kept for second class tanks and the irrigation operation of the Muchkundi Tank in too small to acswer the last sentence of this paragraph.

#### 6. Para. 14 of Memo.

Protective value of irrigation works.—Alushkundi Tank is the only protective irrigation work in this district. The areas irrigated under this tank are given in reply, to paragraph 12. This tank hardly yet protects any area, and its existence makes no difference in the extent of femioe relief operations of this district.

- 18. Q. (Mr. Muir-Mackenzic.)—They wanted o guaron-tee; what would have happened if the water failed?—I coold not be sure of the water-supply in the tanks and so could not give the guarontee, if the water, failed the culti-vators would have come down on us for damages.
- 10. Q. (Mr. Ibbelson.)—I can understand the offitude of the people in an ordinary year, but what obout a fumine year?—The people have taken more water during the last two years of famine.
- 20. Q. Whan was it that you made the engoiries you refer to; was it before the famine or after it?—After the 1896-27 famine.
- 21. Q. (The President.)—In 1891 and 1892 I notice from the toble in your note that the people began well ?—Yes, that is the highest area on record.
- 23. Q. The next year the area wont down to three acres?
- 23. Q. (Mr. Muir-Mockenzie.)—What was the soil commanded?—A good deal of the coll is black roll.
- The President then read the following note by Mr. Ahmadi from page 48 of the Report on Irrigation Works, Bombay, 1901: -
- Rombay, 1001:—

  "While I was at Bagalkot, the Momlatdor was good essugh, at my request, to invite all the prinsipal enlitraters under the Muchkundi Tank to meet me. Most of them came, and a long conference cosned daring which it transprired that the oultivators did ast care to make asso of the water for temperary crops such as rabi and kharif, as they say that the expense and trouble is not sufficiently compensated. It appeared to me that being unaccustomed to artificial irrigation they were not enterprising enough and were quite satisfied with what the raine brought them. Most of them were, however, quite prepared to go in largely for percannil irrigation if they could be certain of a continuous supply, their intention heing to sow plantain, sugarcane, and other paying garden produce. They were deterred, however, by the risk mrelved. They told me that it oost about Re. 200 per nero to propore land for a plantation of the above nature and it began to yield profit ofter two years' labour at the rate of Rs. 100 per use per annual II daring the interval the water-amply failed the trouble and expense incurred would be entirely lost. After a good deal of conversation some of the cultivators come forword with a proposal to make an experiment with 9 acres of land on the water and the transparent. with a proposal to make an experiment with 9 acres of land on the main canal of the tank and 7 nores on its branch on the main candities, and they drew up a statement in vernaeniar which I submit in original. The conditions in effect are that on the lands proposed water should he supplied continuously for five years and in case of foilore Government cheuth nudertake to indemnify them for the actual less sustained, such loss to be determined by a Pan-chayat in the asual way. If this proposal is at all seriously entertained, an estimate of the does incurred of different

periods by the failure of water may be made by the figures given in the penultimate sentence of the preceding paragraph. Although I cannot eay that the cultivators are unreasonable, yet looking to the condition of the tank I connot possibly recommend the proposal. For even if we are fortunate enough to supply them continuously with water during the gnuranteed five years, there is no certainty that the cultivators will increase or even continue the cultivation after the period without n fresh gunrantee. I am aftaid the cultivators will increase or even continue the cultivation after the period without u fresh guntantee. I am afraid that as long as they eee the water standing in the tauk at the level where it usually does now, they will be requiring a guarantee. I sobmit a statement showing the height and quantity of water since its construction and the area which could have cultivated. It thue has to be concluded, therefore, that as the tauketands there ie not much prospect of extending its irrigation, for us stated above the cultivators will not take the water available for temporary irrigation which they want, we use not will not take the water available for temporary irrigation and for continious irrigation which they want, we ure not in position to g narantee u snpply. Thus we have to full hack upon ways and means for improving the supply of the tank. The only practicable scheme proposed in this connection is the extension of the catchment urea of the tank by diverting the Hungargi Nulu into it. This matter was finally disposed of with the correspondence ending with this office letter No. 3554 of the 5th November 1898. I um, however, not eatiefied that all possible lines for the feed channel have been fully investigated. But further investigation is landly possible without a contour survey as suggation is hardly possible without a contour survey as suggested by me at the end of this office letter No. 1310 of 24th March 1898. If this is done, it is just possible that a line may be found for a broad feed-channel with a low dam across the nale giving a very desirable sort of work as a famine project."

- 24. Q. (The President.)—There is, I notice, a project for u feeder from the tank?—Yes, only trial lines have been made so far but the results are pronounced to be discourag-
- 25. Q. What river does the tank depend on f.—The water is taken from the Muchkundi und bas no communication with the ghats.
- 26. Q. Can you suggest uny means by which the tank could be made more useful?—The only scheme is to take water from the Hangargi nala. A dam and canal were proposed but it promised to prove very expansive as there would have to be a good deal of rock-cutting. The idea was to have a dam as well as a canal but the waste weir would prove very costly. If we could divert the nala it would be good thing.
- 27. Q. Is the nals so large that you could not do that?
  —It would probably not be possible to divert the nals without building a dum.
- 28. Q. Tell me something about the Sangogi and Huloor tanks. What state of progress are they in?—On the Sangogi tank the puddle trouch is nearly completed on the left bank.
- 29. Q. Are there large parties on the work ?-At present there are only small parties. At one time we had 10,000 people at work, now we have only about 2,000.
- 30. Q. You have not done much to the dam ?-No, only the puddlo trenches uro being completed.
- 31. Q. The dam is a very long one, is it not?—Yes, nearly two miles long; the puddle trench is 60 feet deep and the water depth will be 65 feet.
- 32. Q. Of course the work of construction of the waste weir has not been touched?—No.
- 93. Q. Do you think it is desirable to finish this work?-Yes, it should be completed, it is a promising work.
- 84. Q. Would the people take water any more than they do from the Muchkundi?—I do not know.
- 35. Q. What is the state of progress of the Huloer orke?—We are filling in the puddle treueb at Huloer.
- 36. Q. There too you have not done anything to the dam?—No.
- 37. Q. Are these the only relief works you have ?- Yes, as far us tanks are concerned, but we have two other relief works for making roade.
- 88. Q. Are they going on now ?-Yes, previously there
- 39. Q. Would it he possible to transfor people from roads to tanks ?-No tank worke are unpopular, not 10 per cent. of the people would go on them.
- 40. Q. (Mr. Higham.)—Why are they unpopular, are they too far away from the villages ?—I do not know the reason, but I know that they do not like to go on tank worke

- 41. Q. You say that on all second class works in the disworks have you got?—From 14 to 16. I believe that all the water in these tanks ie used. I bave nothing to do with them, the Reveune Department looks after them.
- 42. Q. Have you not to repair them?—Yes, when the rayat contributes 10 per cent. of the cost of repairs.
- 43. Q. Do you keep any revenue account of them?—No, the Public Works Department do not keep any revenue account of tham.
- 44. Q. I suppose the Collector doss ?-Yes, the Collector
- 45. Q. To come back to the subject of the Muchkundi, I do not quite understand why the people will not go to the expense of cultivating percental crops on a work of that kind. Ou almost all tank projects which are laid before us, the conditions are similar to the Muchkundi, they are liable to fail at the end of the season. If you have water left in your tank at the oud of the eenson, how is it that the people do not irrigate rabi crops?—It may he because the people are not accustomed to irrigate in those
- 46. Q. But you suy that they do irrigate on all the ecoud class works?—They do. I cannot account for it.
- 47. Q. Supposing we made this tank over to the people and they were allowed to irrigate without payment of now water rate, and we left them to devolop it themselvee, would they take it for rabi irrigation, that would be putting the Machkundi in the same condition as a second class work?— It would be worth a trial.
- 48. Q. It is not profitable new?-No, it does not pay its working expenses.
- 49. Q. With regard to Sangogi and Huloer our you say what the value of the work done on these two worke is ?-I cannot say offhand.
- 50. Q We have to consider whether it is worth while completing these works. You must have some idea of what has ulready been speut on them?—The Sangogi works ure estimated at 18 lakhe.
- 51. Q. Yes, then what do you think is the value of the work done?—At normal rates I think the work done amounts to 1½ lakhs. There are now 2,000 men employed
- 52. Q. Aro they likely to continue?-Yes, till October next.
- 53. Q. Do you thick 13 lakes near the mark as to the amount already spent or would you like to examine the figures?—I chould like to examine the figures, but I think the figure I have quoted is about right.
- 54. Q. If we assume that the works will cost 18 lakhs, you have done 12th of the work?—Yes.
- 55. Q. What is the value of the work done on the Huloor?—The Huloor is a small work. The estimated cost ie 4 lakbs.
  - 56. Q. Yes.
- 57. Q. You were working on it in 1900?—We commonced the work in 1900.
- 58. Q. What is the value of the work done on that tank? I think at normal rates Rs. 40,000 to Rs. 50,000 or about rut of the estimated coet.
- 59. Q. You might finish thle in the course of another two famlues?-Yes, the Huloor tank might be finished during the course of unother two famines, but the Sangogi tank would take longer.
- 60. Q. What about the land under the dam, hue it been taken up?—The land has been partly taken up.
- 61. Q. Of course the rest will not he taken up till uctually required P-No.
- 62. Q. (Mr. Itbetson.)—Do you know anything about the Nilgundi and Inchgori tanks?—No, they were disposed of before my time.
- 63. Q. (Mr. Rajaratna Mdlr.)—According to your system of application there is no gnarantee that the rayat will get water, and there is no certainty if he gete it this year that he will get it next?—We give ue guarantee.

  64. Q. It is open to you to refess to give water?—Yes.
- 65. Q. Does that act se a deterrent?—The operations so far have been too small to judge from.
- 66. Q. Largo quantities of water are left nuntilised, something like 122 million cubic feet were unutilized in 1901, what area could that have irrigated of garden crop

Ahmadi. 6 Jan. 02.

Mr. Ahmali. 6 Jan. 02 and vegotobles ?-I cannot say without the book. About 600 ocres.

- 67. Q. Supposing the rayats were assured that whose the crops fail the whole assessment will be remitted, will that induce them to take water?—My idea is that the people would not only ask for remission, but for componential as
- 68. Q. So mero remission of asyossmeat will not induce them  $P \longrightarrow No$ .
- 60. Q. Do you see any objection to allowing a certain fixed portion of the holding to be irrigated each year?—I think fixed orem of irrigation might give some one one or any other properties.
- 70. Q. I notice that the receipts from the Muchkundi are shown on Rs. 344, the "Miscellancone" item heing Rs. 232, how is that accounted for ?—The "Miscellancone" revenues are from factories in Bogalkot and from sale of babul pods.

- 71. Q. Are there any wells in the area commanded by this tank?—I am not aware of any wells.
- 72. Q. Are there fecilities for the construction of wells and is it probable that water will be found at a reasonable depth?—I cannot say.
- 73. Q. Would it be a good thing to introduce wells in the vicinity of tanks? -- Yes, I think they might be onconragod.
  - 74. Q. Has this point been considered P-No.
- 75. Q. I suppose owing to the presence of the tank the spring level would be higher?—I think it would be higher, but the spring level would be more than 29 feet below the ground.
- 76. Q. With regard to the two projects you have men tioned—the Saoguei and Hulcor, what srea will they irrigate?—The areas likely to be irrigated under the Sanguei and Hulcor have been given by Mr. Beale in his report as 7,000 and 1,700 acres, respectively.

## TWENTY-EIGHTH DAY.

Bijapur, 7th January 1902.

WITNESS No. 73 .- Ma. J. Mollison, M.R.A.C., Inspector General of Agriculture in India,

Me Note by Witness on possibilities in the Decean of exten-sion of projective Irrigation Works.

7 Jan. 03.

The Deccau and parts of the Southern Mahratia Connirgare in greater med of protection by irrigation against drought than other parts of the Presidency. In my note aiready submitted to the Commission I have discussed at some length the volue of wells in these least protected parts. I am aware that the order injected area in the Reccau Districts in 1900-1901 was less than that of 1890-1900 by mearly 00,000 acres. This is attributable to fullure of water supply, the result of scant rainfall in the more open plains during four or five coarcentive years. Good rainfall during one or two years will again ruen the water-level and the well-brighted area will ugain expand. If proper encouragement is given three will be further expansion.

2. At Surat I suggested to the Commission one means of encouragement. I proposed that Government should offer a premium of Rs. 25 per acre of good crop preclaced in the first year between the 15th of October and the list of May by regular irrigation with sweet water from a paker built well. The total amouat per well should be limited to Rs. 100 where the depth is less than 70 feet and to 18-200 where deep and very co tiy wells are required. Nothing should be given for shallow wells with depth to water less than 18 fiet.

3. I would post a actice signed by the Collector in overy The Decean and parts of the Southern Mahratia Connirg

than 18 feet.

than 18 feet.

3. I would post a notice signed by the Collector in overy village in the unprotected ports of Gujarat, the Deceau and the Southern Mahrotta Conaty stating that the object of offering the prominm is to encourage the construction of wells in all favourable positions, so that there would be a means at hand for pradacing tood for the people and their cattle in partions of all villages in funine years or in years of scant rainfall, and also of proriding in these evisions remunerative work for some of least of the people. In the same notice, in order to allow suspicion of interior motives an absolute pledge should be given that Government will not at any time raise the assessment on well-irrighted lands. not at any time raise the assessment on well-irrigated lands in any greater degree then on similarly assessed dry crop lands. The premium which I recommend should pass directly from the hands of the Collector or one of his Assis-

directly from the hands of the Collector or one of his Assistants to the hands of the owner of the well.

4 In the noprotected puts of the Decem I do not expect to see any very nosterial increase of protection by new camb or large tank projects worked by the State. The supplies of water for existing emals can no doubt be increased by additional expenditure for storage. The December of the december of the projects of canal arrigation and such irrigation is not at present to any great extent protective for various reasons. The chief 122-023 are—

(1) that the surface of the December 13.

(1) that the surface of the Decem is rolling and irregular, and the soils which are specially suitable for irrigation except in open plans for from catchment areas occur to a large extent in natches

(ii) that in order to command these palolies the course of a canal near its head work must be exceed-ingly torthous. The canal must to a consider-

ingly tortuous. The ensol must to n considerable extent be constructed through upland, light soil, muram and, hard trop. The prime cost must, therefore, he large and the wasle in leakage from the canal itself will be very great;

(iii) that the distributing water channels have often to be made long distances through light soil which is unsuitable for regular originion. As much water may look from the distributing channels as reaches a field if it is a small isolated area of a few acres only;

(iv) that in years of diought existing chants fail to supply, when most urgently needed, safficient water for the area of crops ordinarily commanded by them;

water for the area of crops ordinarily com-manded by them;

(r) that they are worked more for revenue than as protective works. Intensive percentlal irriga-tion paying high rates on comparatively small area is encouraged. Water-logging to a serious extent has thereby been produced. It will get worse unless drainage is arranged for or a radical change made in the system of irrigation. The intensive sextem of irrigation above referred to

5. The intensive system of irrigation above referred to has produced extraordinary valuable copy of sugarcance in the Poona District. A class of speculator landledge rother than boud fide cultivators has been thereby enriched. Land of good class commanded by the canal has become exceedingly valuable. Latake it that it was not the intensitient of the product of the canal based on the canal b tian of Government that a rank designed as a productive work should be the means of enriching land-owners who are

tian of Government that a casal designed as a productive work should be the means of enriching land-owners who are not themselves entitivators and who, when the pinch of famine comes, accept little or no responsibility in providing food or work for starving people. This landled class of people has been largely benefited by the Kharakwasla Canal and possibly also by the Nira Canal.

6. In eacouraging the intensive system of canal irrigation above roterred to, the irrigation officer pledges himself murally, if not actually, to give canol water throughout the year for the more valuable perennial crops which pay high rates. In a year of drought this pledge maker it impossible forhim to give, to may considerable extent, where sufficient water for irrigation in the hot weather in the following year. He will freely admit that it does not pay to give, at the ordinary rates, canal water to save a withering bharif crop. An enormous amount of water is cirtainly absorbed in the first watering by black coil which has dried and cracked. The owner of a kharif crop in a year of drought wants water however before the soil gets to this slage of drynces. He is prevented from getting water at the right time because a permit is necessary. He does not nayly for a permit until he sees signs of his crop witheriag. He does not usually got it until his crop is patearing. During the last five years canal water has been used

repeatedly to help or save withering kharif crops on the Government Farm at Kirkee. In the 1899 finaine year three wateringe were found accessary. The first watering was get in time. Formal sauction was afterwards obtained. An ordinary sultivator could not so easily have arranged with the Irrigation Department in sufficient time to save his The actual outturn of grain and foulder at the Kirkee Farm from the irrigated crep referred to compared favour-ably with that of ordinary years and ewing to high market-rates was worth about double as much as asual.

- 7. A cultivator knows perfectly well how valuable equal water would be in a year of drought in saving a crop which would otherwise wither; but if he is to take advantage would otherwise wither; but if he is to take advantage there must be no obstacles pat in the may of his getting the water in time. I should therefore make him free to take the water dering the kharif season without a day's delay when he wants it if it is ranning in the canal. I should sulegnard the Irrigation Department as regards water-rates by compelling the oultivator under penalty to give information regarding his requirements on the date he begins to irrigate. He will not take water unless he urgently needs it. The expense of leading water over uneven land with no system of beds is considerable and the water-rate has to be vaid. water-rate has to be paid.
- 8. I confidently believe that the Kharakwasha and Nira 8. I confidently believe that the Khamkwash and Nira Canals which are the mest important irrigation works in the Deecan, would be much more protective than they are and would irrigate much larger areas than they do (a) if less water was saved for irrigation of psreamial crops hotween the let April and the break of the next mensoon; (b) if more water was used during drought for khurif crops; (c) if free scene is given for the irrigation of food grein and other crops between the middle of October and the let of April. I believe that higher rates than these now charged for kharif and rabi irrigation would be quite justified. But in any case until experience and results are obtained, the question of revenue should be made enberdinate to that of scenrity uguiust famine. that of security uguinst famine.
- 9. I am entirely against irrigation officers pledging thamselves either morally or actually to give canal water for perennial crops between the let of April and the beginning of the rains in any year. I would rather be inclined to issue a year's notice to the present sugarcane growers and others to the effect that the Irrigation Department cannot grar-antee in any year a supply of canal water for perennial crops between the 1st of April and the break of a favourable
- 10. Within recent years many of the sugarance crops grown under caual brigation in the Poona Districts have been exceedingly valuable and the superior helders or

- eccupants of the land thus irrigated can very well afford Mr. to construct wells to irrigate their crop in the hot weather. J. Mollison. The chances of getting water at reasonable depth are pretty certain and the wells if constructed will be a great safegaard during season of scant rainfall and will in all seasons be a mataul help to the canale.
- 11. Mr. Visvesvaraya has explained to me the bleek system of irrigation which he has proposed for canals in his charge. The system would in my opinion set excellently if he can get village communities to choose their areas, if each village community regulates the distribution of the water equally to the village block and if perennial irrigation is restricted.
- 12. I do not think small tanks in the open plains of the Decean will be of much ase. They will not fill except in years of exceptional ruinfall and even if full in the mins years of exceptional rainfall and even if full in the rains they will not held water long during the fair season. Mr. Visvesvaraya proposes to have storage tanks along the course of a causi to be filled as required from the canal. The proposed is, I think, cound and could be made to fit in with his proposed block system of irrigation. Leakage from such tanks would help well irrigation. But it is very difficult to see how water rates no to be arranged for this mutual support system unless a village community agree to pay a lump sum for a term of years for the irrigation advantages received. The community could apportion among thomselves the amount which each eccupant should pay. Theoretically there are great pessibilities, but I do not quite see how it is all to work out emosthy in actual practices. practics.
- 13. There is great seeps for extension of irrigation by pat from bandharas throughout the Decean. Extension of well and pat irrigation should be encouraged together. A well and pat irrigation should be encouraged together. A complete survey regarding possibilities is required. Only practical experienced officers who can consult the people as to their requirements should be put in charge of such survey. The surveyor will determine where pat irrigation is practicable without infringing on down stream rights. Having determined this point, village communities should be encouraged to undertake the work themselves. No charge for the water should be made for a term of 5 to 10 years. Afterwards a very medicate lump sum for each handlesses. Afterwards a very mederate limp sum for each bandhura should be charged. The people can make their ewn arrangement regarding apportionment. Government should also give an absolute pledge that the assessment of pat irrigated lands will at no time be raised higher than similarly assessed dry orop land.
- 14. I helieve that if the people are encouraged to construct wells and bandkaras throughout the Decan in the manner I have sketched a very full measure of protection against famine will be reached in a very few years.
- 1. Q. (The President.)—We have received your paper and I have read it with a great deal of interest. I gather from it that you think the best means of protecting the country sgainst famine is by wells and bandharas?—Preoisely.
- 2. Q. Although it is a recognised fact that in times of 2. Q. Although it is a recognised fact that in times of prolonged drought the water in wells goes down considerably f—It certainly goes down, but I imagine that canalirrigation would go down to the same extent or even more. During the past 5 or 6 years, a worse condition of affaire has been experienced than usual. There have been a succession of famines since 1896-1897, and not rithstanding that fact the wells have done computatively well.
- 3. Q. You believe irrigation from canals has gone down equally !-- Yes.
- 4. Q. Tuke the Nira canal; has that gone down?-No. but the circumstances there are exceptional.
- 5. Q. What makes you say so !—The conditions on the Nira are most favourable. It is led away from a catchment valley in the Ghats straight to land most favourable for irrigation.
- 6. Q. Is it the only valley of the sert available?—You could get land as favourable for irrigation in the open plains of Ahmadungar, Shelapore and the Senthern Maratha country where similar conditions might develop, but not, in may judgment, so near the entchment area.
- 7. Q. You would have your cand leaking so that when you reached a good spot your water would be all gone?—That is an engineering question. I would like to see a thorough survey made.
- 8. Q. (Mr. Ibbetsen.)—The loss of water that you refer to would be the same in all years, why should canal

- irrigation decrease in famine years?—The head-works would not fill in a famine year. The depth to water in a well is not much greater in a first famine year than in an ordinary year, and it is not much worse them an ordinary year in a second famine year: the supply of water in a well is safer than a supply of water in a canal.
- 9. Q. (The President).—Is not the snpply of water equally good in the Ghats?—In the Ghats eatehments you get min probably in a famine year, but even with this safeguard canals are not so protective as wells. On the Mutha Canal in the Kharif season a good deal of water raus to waste in ordinary seasons. If good rain senses in October the people freely apply for water for sugarcane; if the late rains are deficient such applications are not freely made. deficient such applications are not freely made.
- 10. Q. That is, they muticipate that there will be a decrease in the canal supply. May it not be that there will be a decrease in the canal supply. May it not be that there will he a greater demand for other crops?—Thay know it by experience. Cane is planted between Documber and the February following and when the cultivator knows positively that the canal water-supply is sufficient he is keen to apply for water for caue. If there is deficient supply no cane is grown.
- 11. Q. (The President.)—May not the bad supply for cano arise from the greater domand for other orops rather than from a less actual supply of water. Porhaps Mr. Benle can tell ns.
- Alr. Beale.—The Kharakwash always fails; but irriga-tion in the het weather depends on the balancs in the tnak and that depends on the late rains; if these are good less water is used for rabi and there is more to spare in the het
- 12. Q. (The President.)—In paragraphs 2 and 3 you suggest a plan for encouraging well irrigation by giving

Mr. preminms on good orops. Would it not answer the purpose J. Mollison, equally woll to give money for wells?—If no interest is charged much cusourgement would result.

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- 18. Q. In paragraph 4 you say, "The Decam, generally lands itself unfavourably to any lerge system of canal irrigation and such irrigation is not at prosent to any great extent protective for various reasons." Then you go on to give five reasons for it. All those objections are financial. It would oost more to got the water on to the land?—It is a question of cost per unit of supply. There are no physical impossibilities.
- 14. Q. You mean that there are no physical impossibilities, but that it is merely a question of whether it will pay?—It is only a matter of money.
- 15. Q. (Mr. Higham.)—You think the money could be spant better in another way?—Yes, I think if the money were spent on wells it would go further. Canels cost Rs. 200 an aere Irrigated. We could do a good deal with that cepitel in extending well irrigation and do more good.
- 16. Q. (The President.)—Then you mean to say that the canels are worked more for revouse than as public works. That is en edministrative metter, G overnment might arrange thair working as it pleases. I mean it is in the power of Gororument to sey that the onnal must be worked in this way or that?—Yes, but dofinite orders one way or the other should be issued to the Canal officers.
- 17. Q. You say "a oultivator knows perfectly well how valuable canal water would be in a year of drought in saving a crop which might otherwise wither. I should, therefore, make it free to him to water during the kharif season without a moment's delay." Would be not understand that water could be taken when necessary? I thought that Mr. Vishweshwaraya told us the application in the monsoon was done away with?—Water is not given without application. Proposals have been made to give definite supplies of water for particular hlocks of land in particular villages. Mr. Visvosvaraya has proposad, I believe, some guch system.
- Mr. Ibbetson. Yes, but I believe the ralaxation is limited.
- The President.—That again, of course, is not a matter inherent in the canel. It is a question of administration.
- 18. Q. I do not quite undorstand Mr. Visvesvaraya's "block" systom; can you tell as something about it?—He proposes to guarantee water to 200 or 300 acros per village and restrict the irrigation of perennial crops in those areas so that a good deal of water will be available for rabi crops.
- 19. Q. Then, does he propose that the village should confine itself to irrigate this area?—He calculates how much water he can dispense and distributes the water muong certain villages; he leaves the cultivators free to divide the water among themselves. He thinks in that way the cultivators will make better use of the water.
- 20. Q. But he takes it upon himself to say how far the water should go. He does not leave it to the cultivator f—He believes that this system will economise the water.
- 21. Q. Yes, hut supposing n cultivator under this system had water for 10 seres guarantsed to him, would he let him distribute it over 16 neres if he wished to do so?—Ho gives the village n certain quantity of water and leaves it to the oultivators to distribute the water among thomselvos. He has no objection to their using the water on an increased near.
- 22. Q. You say, "I do not think that smell tanks in the open plains of the Deccan will be of much use. They will not fill in the rains except in yours of exceptional rainfall, and even if full in the rains they will not hold water long in the fairseason." Is that so in Gujerst also?—That does not apply to Gujarst but to the Deccan, where there is excessive lenkage through muram end trap.
- 23. Q. (Mr. Ibbetson.)—The rainfull in the Decean is small and uncertain?—Yos, scantier and more uncertain than in Gujarut.
- 24. Q. (The President.)—Then you go on to the question of bandharas irrigation. You presume in thet ease that there is water in the rivers ?—I know that there is water in the streems which could be utilized.
- 25. Q. Has the Government opposed the use of water from the bandharas?—The Government has opposed it in a sense, heense if the oultivator takes the water he hes got to pny for it. I would do eway with the whole system of cherging for the use of water from nallaks and sub-soil water overywhere.

- 28. Q. It comes to this.—You think that it belongs to the riversin population and not to the population at large?—You give it free for men and cettle to drink and you refuse it to the thirsty lead. I would only charge where Government incours the cost of the bandharas.
- 27. Q. (Mr. Ibbetson.) —In the Decom only or everywhere?—Everywhere.
- 28. Q. (The President.)—You sey "I believe that if the people are encouraged to construct wells and bandharas throughout the Decenu, in the numer I have skotched, a very full measure of protection manner I have skotched, a very few years". If that wore corried out to the fullest extent could you give any idea as to the amount of cultivated crops we might expect to see under irrigation in a bad year?—The present area under bandharas is trivinl; the well irrigated area is about 700,000 nores. It might in time be doubled.
- 29. Q. But the culturable area of the Deccau is 20,000,000 agree ?—Ninety per cent. of the oulturable area is ansuitable for irrigation. There ore many uplands where the soil is too thin and rocky.
- 30. Q. (Mr. Ibbetson.)—Too rolling?—Yes. I won't sommit mysolf to 90 per cent. If you have 1\{\} millions of acres under wells this would be the pick of the land of the Deccan and the difference of outturn will be considerable. We would be concentrating our offerts on the best part of the country—the pick of the land—which will produse \(\frac{4}{2}\) to 0 times as much as poor suil even without water; add water and you would still further increase this.
- 31. Q. Would you not store water?—Yes, canals from atered water would help well irrigation by keaping up the water level. In the ease of a bandhara with a little storage a man would probably protect himself further by building a well.
- 32. Q. Woold you store the water that fulls in the hills every year or would you lot it flow away?—That is an ongineering question. The Engineers can decide whether storage is required. I have not the experience to offer an opinion.
- 33. Q. (Mr. Higham.)—I understand that you deprocats canni irrigation in the Decean P.—Yes, I prefer well to canni irrigation and preferably would like to see well irrigation extended.
- 34. Q. Although you have an enormous rainfall in the Ghats, no efforts have been made to utilize it for irrigation in the Decom?—You would do quite as much good by spending the money that it would cost to bring the water down, in making wells.
- 35. Q. Have you worked it out in any way?—Yes, I think well irrigation is cheaper. A coool cests Rs. 200 an acre and that amount would go a long way in extending irrigation by wells.
- 36. Q. How many neres would you irrigate for the Re 200 applied to the construction of a well P—A Deceau well working 2 mots would irrigate 6 or 7, acres and would cost from Rs. 300 to Rs. 400.
- 37. Q. (The President.)—In Sholupur we were told that wells cost a good deal more than that.
- 38. Q. (Mr. Thbetson.)—You refor to a kachcha well ?— A kachcha well in the Deceau is huilt so well that the sum necessary to complete it is not a great deal.
- 39. Q. (Mr. Muir-Mackenzie.)—Would you say that euch a well would last for an indefinite period?—Kachcha wells in Gujarat fall in with rain, but in the Deccau whose the hase is rock, it only requires massury built up on one side for the mot, and a well so constructed may last indefinitely.
- 40. Q. What is the eren in the whola of the Descau which could be protected by wells?—At present the meximum arm is 700,000, hat I should be extremely glad to see the present aree doubled. 140,000 acres is the limit of possibility in my opinion.
- 41. Q. (Mr. Ibbetson.)—The present area is only about 2 per cent, of the Decean?—I should say not more than 2 or 2; per cent.
- 42. Q. (Mr. Higham.)—If you double that it gives only 5 per cent.; that wou't keep famius off—The land thus irrigated from walls would be the best land and would give an outturn of great value in a famine year, and very valuable erops in ordinary years.
- 43. Q. What about the other lands ?—The outturn from the uplauds on an average is extremely poor.

- 41. Q. In order to get more than 5 per cent. something more will have to be done. Wells will not afford full protection, what else do you propose?—I have no objection to canals so long es you do not mind the cost and regulate the distribution so as not in damage the land. A lot of land irrigated by the canals in Poona is going out of onlivation, because it gets excessive irrigation. Give a man a well and you will find that his land will not go out of cultivation.
- 45. Q. Why do you limit the possibilities of wells to 1,400,000 acres P—The area of low-lying lands with 2 to 4 feet of black coil nud muram bolow limits the increase. I don't think invourable positions for wells other than these can be found. You can put too many wells together in a small area, one well drawing on the enpply of another. They must be distributed.
- 46. Q. (The President.)—How far appart should they be P Would you say 10 acros to a well P—I think that two wells in the most favourable positions might be put in 10 acres, but it depends on the slope and the catchment. In Junnar and Khed (Poona District) two wells in 10 acres would be marked to such perfectly snfo.
- 47. Q. (Mr. Higham.)—You are afraid that wherever canol irrigation is introduced the result will be the growth of perennial crops by wealthy expitalists and not much protection in the population generally ?—That depends on the nrders of Government. If left to the Irrigation Department us nt present, I don't think there is any likelihood of a chaoge in the system. They attempt to work the canal more for revenue than for protection.
- 48. Q. The Nira Canol is not worked for revonne; the percentage of cane cultivation is only 8 per cent.?-It will extend as the mon gat richer.
- 49. Q. It is kept down artificially by conserving the water for rabi crops ?- It is left to the option of the controlling officer.
- 50. Q. Surely an acro of cano irrigation has great pro 60. Q. Surely an acro of cano irrigation has great protective value, whether in the hands of capitalist or cultivator, than an occe of dry crop. Supposing you had lots of manure, could you increase the area?—I showed you at Manjhri the extreme limit to which cano cultivation can be got with suitable soil, manure, and water. It is possible to get segarcane crops under favourable conditions worth Rs. 1,000 per acro which would give 12,000 or 12,000 before. 18,000 lbs of gur.
- 51. Q. How much of that is the value of manure?-Its. 200 an acro.
- 52. Q. The purchase of that manure must maintain a good many people?—Yes.
- 53. Q. So that altogether an acro of cane will main-53. Q. So that attogether an acro of caue will maintain 4 or 5 more people than an acre of juart?—Yes, but for perennial irrigation it is required that a good deal of water should be stored up so that water can be given in the hot weather. That makes it impossible for irrigation to be given freely in the menesou. Therefore, in a year of draught the crops in that particular year absolutely wither, because a pledge has been given by the Irrigation Officer for a portion of the water nine months alread.
- 54. Q. That would not be so if the cane crop was limited to a certain area?—The limit I propose is that there richer capitalists who grow sugarcane should be given water from the canal only if they have a well. If they can slived to buy manure and can affired the other expenses necessary for growing a good crop of cano they can equally well afford to dig their own wells.
- 55. Q. Supposing you made a condition that before cauctioning percential crop irrigation in any holding a well should be constructed, would that prevent the full utilization of canal water in the case of a new area?—I do not think that in the engarcane area of Poona it would have any deterring effect, but with new areas it would have any description of the area of the conditions of the conditions. limit the utilization of the caual supply.
- 56. Q. I am not speaking of a deterring effect. If he roode his well we should not reserve water for him in the hot months?—That is all very well now, but suppose we had a new work and you said I will not give water unless you have a well; the man might not grow sugnressed at all.
- 57. Q. From your point of view that is what you want?
  —What I object to is that so much water is taken up in a
  year of drught and not given to ordinary food-grain
- 58. Q. The only practical remedy for that seems to be to have no canals at all or to say that permanial arrops must be partially protected by wells?—I have ne objection to that.

- 59. Q. You think that in a new work ne one would ge in for irrigation ou those conditions ?—Yee, but in the case J. Mollison. nf established works the men being capitalists they can afford in build a well in order to continue this profitable 7 Jan. 02. perennial oultivotien.
- 80. Q. Of cooree one point has to be remembered; it is "all very well to talk of working a canal for revenue. But there is n limit to mency that can be speet without any hope of return, and that if any portion of that expenditure will bring a return, you will have more money to spend elsewhere—Suppesing the limit of expenditure of your purely protective works was 100 lakke, if you can get a return of 20 per cent, thee you can afford to spend 20 lekks more on the works?—That is true, but it would be better to more nn the works?-That is true, but it would be better to spend the money on wells.
- 61. Q. (The President.)—Why should not a man go in fur a well for sugarcane on a canal as well as aff. a canal; you say that off a canal hie land is used for ather crops; you dit not be a greater recommendation for takevi if he can go in for sugarous P—In ordinary seasons be does grow sugaroane on his well, but in a famine year he nhanges his system and grows fodder and food-grains.
- 02. Q. I do not see, where a man applies for takavi and goes to the exposes of digring a well, why he should not do it if there is the axtra inducement of onual irrigation to assist him in irrigotion. Why do you say that he will not come forward?—I did not say that he will not come forward? I will be might not. forward; I said be might not.
- 03. Q. (Mr. Ibbetson.)-With reference GS. Q. (Alr. Inbetaen.)—With reference to what you have just soid about a man who had a well changing his system in a yeer of drought, it would be just the enmo if a man growe cane on a well: he could not afford to let the cane go in order to water his other crops during the monseon?—The result in the Kaira district and generally the purpose was that all ordinary market smaller. throughout the Decean was that all ordinary market gurden crops were given up in favour of fodder and juari in 1896-97 and in the last famine, and there was an enormous yleld of fodder in consequence.
- 61. Q. By "given up" onn merely mean that they were not planted?—Yes, garden crops were not grown.
- 05. Q. It would be exactly the same on a canal. In a year of drought the people would profer to grow fodder instead of garden ereps P Yes, that happens on the Matha
- 06. Q. Then so far there is no difference between cannil and wells, the change of crop takes place equally on both ?—The proportionate area of garden crops under canals as compared with cane is much smaller than under wells.
- 67. Q. Nnw, so far as cane goes, is not the woll-ewner as much bound to give water to his caue as the esnal irrigator?—Cane pledges water far a longer period thou garden crops and the case area is less under wells then under
- 68. Q. You are arguing almost ontirely from the Kharakwasla. Are not the conditions exceptional there P There you have an enormous city with rich manure, land closs by, and wealthy capitalists who can easily keep an eye agon their investments. Do you think the sinte of affairs that exists near Poons would spring up if you had the canal for from the city?—The Mutha Canol is a special work; the conditions on other works would not be se
- 69. Q. How about wells close to Poona; would they irrigate a larger prepertion of case than wells elsewhere ?— Yes, probably, but case oultivators, prefer to use canal water, paying for it Rs. 50 per acre. They use their wells only in the hot weether when the caual supply is intermit-
- 70. Q. (Mr. Higham.)—What is the average percentage of cane under wells?—It is very trivial.
- 71. Q. If a man has 4 neres how much of that won be caue?—A fraction of an aerc, possibly.
- 72. Q. (Mr. Ibbetson.)—Is the proportion of cano grown under wells in the Decean smaller than in Gujarat ?—Yes, probably.
- 73. Q. Your impression is that it is smaller in the Deccan ?-Yos.
- 73. U. As to your preference for welle over candis, you have described the conditions under which wells can be made and worked profitably; and you have also taid us of a lorge area in which irrigation cannot be used profitably. Is there not a considerable intermediate area in which wells cannot be made, but which would be worth protecting by irriga-tion?—The areas of this class aucommanded by welle are

Mr. very considerable in Ahmedaagar, Sholapur, and the J. Mollison. Southern Mahratts Country. These uplands might be north protecting.

- 75. Q. So that there is a considerable portion which you cannot protect by wells but which can be protected by canals?—The meanro question would then come in. It would be a very serious consideration. There is a limit to extension on account of the supply of manure.
- 76. Q. All that means is, that protection by irrigation from wells is to be preferred because it is slower than canal irrigation?—I think the irrigation of lands manned under wells is more efficient than under canals. Regular irrigation is given instead of heavy waterings ones in eight days as is the case with canals. By heavy waterings from the canal the maaurs is swept away and the soil becomes water-logged.
- 77. Q. So that as regards that area which can be protected but in which wells cannot be made, your main objections are the fear of the failure of the manner supply, the nisk of water-logging, and the consequent salt offlorescence?—Yes, unless the system of canal irrigation is improved.
- 78. Q. I quits see the danger of water-logging ln Gujarat; hat with a shallow black soil with muram underneath would thore be the same danger of water-logging?—Even with muram below I have seen water-logging in the lower lying areas commanded by canal irrigation. This is due to direct leakags from the canal, and the drainage from over-irrigated high lands to lands lying at a lower level. The result of this loakags may be seen in overy mala on the G. 1. P. near the Mutha Canul.
- 79. Q. It is not so much the irrigation us the leakage in transit that you fear?—Yes; the less is enormous.
- So. Q. The loss of course is a mere matter of money, the water-legging is not. Sapposing that you kept all canal claunels full but did not put water on the land, well the leakage from the cause keep the nalas running? I want to know how much of this leakage is due to irrigation and how much to less from the canal?—The nalas were usually dry in the fair season before the canals were made. Now they are personnal. The most serious less is from water-legging.
- 81. Q. It is the actual irrigation you are afraid of than P. The leakage from the channels is much less than from the irrigated area. At the same time, I would like to state that Poons City is said to be water-logged since the causi was made. I know an instance of a well in the compound of the bungalow of the President of the Poons Municipality which cost Rs. 5,000, where the water level was formerly forty feet below the surfaces and it now stands fifteen feet from the surface.
- 82. Q. I want to got you away from Poona, if possible. The comparison between Poona and the ordinary canal is not satisfisotory: let us go into the villages. Is there much waterlogging on the Nira Canal P.—No. The disadvantages produced by water-logging are compared with the great advantages the canal has brought. I went through the valley in 1896-97 and found it green throughout. The advantages of irrigation there are great. I noticed very slight evidences of weste of water and of salt efforcescence.
- 83. Q. Nothing to constitute a material drawback to the advantages accruing from the canal ?—No.
- 84. Q. You say that the nalas run with water leakege from the canal. Does not that show that there is a very effective natural system of drainage?—Yes, that is so, but the railway often interferes with the free flow-off.
- The President.—We have heard that stated by several witnesses wherever we have gone.
- 85. Q. (Mr. Ibbelson.)—I should like to have your opinion as to how far it would be safe to apply a strong mrificial stimulus to the construction of wells. We are told that many wells under in the famine of 1896-1897 are lying disused, and that many of those made in the last famine will not he used again, and that so long as a men has capital only will he work his well. Would there not be the danger, if you stimulate well work too much, of the people completing them for the sake of the bounty?—There is no dealt that the people have had a very great knock. During the last five dry years the wells did not give a proper measure of their ose. I do not think that there will be any risk in stimulating the construction of wells to the fullest extent. After two years of good rainfall the people will come forward. They wiff not, I feel sure, want to go too fast.
- 86. Q. You do not think you would outrun the macure supply?—I do not think there will be any risk of that.

- 87. Q. You don't think people would make wells who could not afford to use them in ordinary years?—No.
- 88. Q. I take it that in the Decenn and Gnjarat a man canoct afford to work a well in ordinary years except for high class crops?—The actual rate of working a single mot well exceeds Rs. 100 per acre.
- 89. Q. Yoo object to canals bocaese their protection is absorbed by wealthy capitaliats. Is not that vsry much the case in regard to wells also ?—It is often the case in a time of fumine, if the well is n good one, for a number of families to clah together. They each supply a proportion of the labour and of the manne and each participates in the profit. This system of co-operation keeps the owner's own family and the others who work nuder the well off relief work.
- 90. Q. That is that a man will share well water with his friends ?—In Kira in 1899 and in Ahmednagar in 1896-97 that did occur in certain parts.
- 91. Q. We were told yesterday in Bijapur that such a thing was unknown. What is to prevent the people from doing the same with canals?—Because in my experience the wealthy land-owner, when the punch of famine comes, throws his responsibilities regarding the maintenaure of servants, etc., on to Government.
- 92. Q. With reference to the working of counts on protective rather than productive lines, to refuse water to cause in ordinary years would mean that the water would go unased?—Yes, the water would probably go enused dering the moresoon.
- 93. Q. Would the people use it for dry crops?-Yes, a good deal for the rabi crops.
- 94. Q. Thoy would wait to see first in an ordinary year if there is going to be a good rainfall.—Yes.
- 95. Q. At any rate much of the supply would be wasted?—The mater could all be used up for rabi and gorden oreps.
- 90. Q. You believe that if we brought the cause into a suitable tract, we could get all our water used for rabi irrigation, wheat, juani, etc. ?—Yes, these food-grain crops nu for market garden crops such as onious, sweet potates, etc., occupying the ground between October and Mosch. The water would be used for ordinary rabi crops not for personnal crops.
  - 97. Q. Erorything but sugarcane?-Yes.
- 98. Q. You think they would use all the water in ordinary yours?-Yes.
- 99. Q. Supposing you found that they did not, would you then teense to supply water to a crop of vegetables or cano because you thought the monsoon might fail?—I would refuse water if there was a chance of a bad monsoon in the coming season.
- 100. Q. If you could not use all your water on other crops would you then gire it to came?—After meeting the demands of the other crops I would give the halance to sugarcane.
- 101. Q. Now with reference to the royalty Government takes on water used, in the case of the Decean I quite agree with you. But in Gajarat where only two famines have occurred in 100 years, and where therefore the danger of scarcity is small, do you not think that it is reasonable that Government should take a small contribution for the water used 2—xes, perhops in Gujarat, but I would certainly creduce the Panch Mahals and other parts where the people are poor and it is advisable to encourage irrigation in every possible way.
- 102. Q. If I exclude all inscoure tracts would there be anything nurresonable then P-For inscoure tracts I consider that no water tax should be raised.
- 103. Q. I am assuming that the principle is accepted in regard to tracts in which relief is commonly needed?—I agree that Government can easily collect a royalty on water is secure tracts without causing hardship, but in bombay it is not worth while differentiating between tracts which are secore and those which are not.
- 104. Q. Yon say a Deccan well can be made for Re. 300 or Rs. 400, is that n fair average?—For a well of a depth of 25 to 50 feet that is n fair average. The expense in making a pakka well is not mach more than Rs. 400. Where there is soft soil to some depth the lining would be more expensive. But where there is 3 feet of black soil, then hard muram, and finally trap rock, Rs. 400 is a fair average price.
- 105. Q. Do you mean to say that such a" well would last indefinitely ?—I think so.
- 106. Q. Then why does a oultivator ever go to double the expense?—If the land is alluvial the well has to be deeper.

107. Q. In the Deccan ?-Yes.

108. Q. Why do the people go to the expense of making n pakka well when a kackcha well such as you describe lasts for ever?—Kackcha wells which last for a lang time are found only where the sub-strata are hard and durable. Many such wells are found throughout the Decean.

10b. Q. Are pakka wells built with stone and mertar throughout P-Yes, when black seil is deep it is necessary to

110. Q. (Mr. Muir Mackenzie)—Are the majority of wells you know in the Decembined or not lived ?—A great many are built up only on the mot side.

111. Q. (Mr. Ibbotson)—Now, Mr. Mollison, you were good enough at my request to look at the irrigation in the north of India, and to make enquiries regarding the differences which exist between the extensive equal and well irrigation ces which exist between the extonsive each and well irrigation as practised in the Punjab and Aorth-West Provinces and the intensive system as practised in Bombuy. Would you kindly tell us what is, to your mind the main difference between the two systems?—A vast area in the North-West Provinces and the Punjab is commanded by the Gangas and Junna systems of causal irrigation and by deep nad shellow wells in parts where the small distributing channels do not reach. The ordinary cropped area consists of very deep alluvial soil of very fue consistence and of great natural fertility. The character of this soil is such that after arrigation moisture is retained near the surface for a considerable period. This retentive quality is belied by copions deposition of dow throughout the cold weather and probably the atmosphere in the north of India at this particular season is a or marry so absorptive of sall moisture as In the more southern parts. The practical effect is that a tirst watering given from a causi or well softens the soil so that preparatory tillage for a rabi crop or for an early sown kharif crop is facilitated. The moisture remains in the soil until tillage is complete, the seed is sown, and satisfectory kharif crop is incilitated. The moisture romans in the soil until tillage is complete, the seed is sown, and satisfectory germination has occurred. Subsequently two waterings from a canal or three or four from a well is sufficient to bring n rabi wheat crop to maturity. This crop mixed with rape seed or gram is the chief rabi crop grown. The total cost of leading the water acer the field for the first watering, in laying out beds for irrigation, and in applying the water is very trival. It does not exceed 8 annes per acre. The distributing channels are made of puddled soil. They allow no lealings of water. The surface of the lields is even; the water in large volume is easily distributed; therefore the cost of the first watering is small. The villagers have the usual number of work and breeding cattle and milk bullhlocs of any ordinary district. The dung of and milk buffiless of any ordinary district. The duty of cattle, the litter and the hunscheld waste is carefully preserved. The manure heap which each occupant thus accumulates provides the only manure applied to the irrigated fields. It is a very light dressing; awing to the character of the soil and lightness of the irrigation, this light dressing of manure on an irrigated crop is quite as effective as if the soil was kept moiat by timely showers of rain. There is no difference in offect whether the irrigation is by flow or lift from causals or by lift from deep, medium or shallow wells. The contrast between this system of irrigation and wells. The contrast between this system of irrigation and cultivation and that necessarily practised in the Bombay Presidency is very pronounced. Medium black soil with murum below (the best black soil to irrigate in the Deccan) dries so quickly between waterings that irrigation is required every 8 to 10 days. The gorads (sandy loam) soils of northern Gujarat are se absorptive and dry se quickly that irrigation is required in the tair south every five me six plays. Such arrigation is exceedingly expensive from wells owing to the cost of mixing mater. Heavy from wells owing to the cost of raising water. Heavy dressings of manure are required on the limited areas irrigated because owing to cost of lifting water only very good crops will pay. A really good crop van only be produced from good sell by regular irrigation and heavy dressings of manure. Unfortunately the heavy and continuous irrigation washes much of this manure into the subscell and the groupout takes are a certail a proportion. sub-sell and the rroy only takes up a certain proportion. With this intensive system of irrigation a single mot or kas (leather hag) will only lift water from the deep wells of (bujarat for an area of aliont two notes and from the shallower wells of the Decean lor on area of three and n half form the form the little of the Decean lor of three and n half form the little of the Decean lor of three and necessarily little of the Decean lor of the little of the lit statiower wells of the Decean for an area of three and a luft to four acres. In the Hissar, Delbi and Rotak districts of the Panjab I have seen deep, medium and shallow wells at work. I have found deep-wells, the masonry construction of which extended to a depth of 110 feet, with depth to water of 60 to 70 feet, irrigating cach six acres of whost or barley: medium depth wells 30 to 40 feet deep, irrigating 8 or 10 acres per leather bug, and on the riverain land, wells with 20 feet deepth to water irrigating 12 to 11 acres each. The year deep wells were this war worked some acres cach. The very deep wells were this year worked very

hord because the kharif crops owing to deficient rainfall failed, and there being no means of canal irrigation the failed, and there being no means of canal irrigation the failed, and there being no means of canal irrigation the failed, and there being no means of canal irrigation the failed upon the wells. Relatives or families fointly finding all the manure and labour required to produce the best results. The same practice occurs in the Decean and Gajarat in a famine year. The natural fortility of the tianges-Jaman alluvial soils may to some extent be gauged by the fact that on soil of this class in the Cawapare Government Farm irrigated wheat has been grown siece 1881 without manure and the eron of 1900 grown sioce 1881 without manure and the crop of 1900 yielded, approximately, of grain per acre 1,20 lbs. from one plet and 1,400lbs. from another. It may also be one plot and 1,400lbs. from another. It may also be gauged to some extent by the fact that in the Hissar district in the current year (a season of unfavourable rainfall) land irrigable by lift from the canal is freely rented out at Rs. 15 per acre for the year or at its. 10 to 11 per acre for one orep. Tenants pey in addition all irrigation charges. The canal water is only lifted a few feet und irrigation therefore is not costly. In the same district I found land irrigated from a well with depth to water about 60 feet rented at Rs. 8 per acre. It is not annual to take a kharif as well as a rabi irrigated crop in one season under e and irrigation, but it is more common to depend upon our good rabi irrigated erop or in a year of favourable raintall on one good dry crop only. If the latter requires to be once irrigated to bring it properly to matmrity, the charges for canal irrigation is 12 amos per acre and, as already stated, the cost of applying the water is trivial or negligible. The rates for canal water in the district inspected vary up to Rs. 5 per acre for sugar cane, Rs. 2-8 for wheat, 12 amos for a single watering, and half rates for water lifted from canal. I considered that approximately accurate outterns were more freely admitted by the actual cultivators than in Bombay; and from data communicated, I believe that the grain from an acre of canal irrigated wheet crop would ordinarily exceed Rs. 30 per acre, and of well irrigated and excluding cost of light dressings of mamme (the avinal value of which can only be approximately) other expenses including assessment coold not possibly exceed Is. 16 or Rs. 17 per acre. gauged to some extent by the fact that in the Hissar district can only be approximated) other exponses including assessment coold not possibly exceed lis. 16 or Rs. 17 per acre. The only risk is damage by rust, and that is inconsider-

112. Q. Pujarat is essentially a monsoon or kharif erop outsity; is it not, except for cotton? -Yea except for the extensive wheat and outton crops in Ahmudabad and Breach, Gajarat is a kharif province.

113. Q. Pulting aside the wheat and cotton tracts the whole of the remainder is kharif?—Yes.

113. Q. On the other hand the Descan, broadly speaking, is a rabi province?—These parts of the Descan and Southern Muhrutta lying inland noil some distance from the Ghats are chiefly rabi. The western talukas of Poona, Nasik and Khandesh me chiefly kharif. In the eastern black soil parts of Dharnar crops of coltan and juar are sown between the two measeens.

115. Q. What period is that?—In Dharwar cotton can be sown in Soptember or as late as October, as it gets the north-rast monsoon.

116. Q. Can you give me any broad reason as to why one province is khari, and the other rabi?—It is entirely a question of rainfall. In Sholapur and Nagar and the castern tolukas of Prona the important rain is the late or rubi rain. The character of the soil is such that if you have a good late rainfull, the rabi crop graws particularly well. In Sholapur and Ahmednagar with heavy October rain there is a good juari crop.

117 Q. Except in the tracts under the Ghats, I suppose very little vice is grown in the Decean? - Practically no rice is grown in the Decean, except under the Gunts, but some is grown in the western talukas of Belgauia and Dharwar.

118. Q. I suppose that is because the rain is lighter and the soil is not suitable?—In the Chats there is a minufull of 150 inches more or less, which rapidly diminishes till it is only 30 inches in Poous and 20 at Ahmediagar. The rainfall is small away from the Ghats.

119. Q. That exploins the absence of smull tanks ?- Ye-, they would not fill.

120. Q. We are told that people here will not take maler from a tank because they only get it for a certain partion of the year. They have the idea that if a dry crop is given water once, you must go an giving it water. Does that feeling exist and is it based on any reason?—I doubt if those are the true facts. I slould put the refusal to lake water down to various reasons. The soil may be unsuitable,

- J. Mollison, tank may not fill well; the occupants of land under the J. Mollison, tank may not be good cultivators. When water is refused from a tank, I should say previous enquiry before the tank 7 Jan. 02. was built, if properly conducted, would have accounted
  - 121. Q. You are far awny from my point. Teke the case of n canni, well established, irrigating sugarcane and garden crops; in a year of droaght the water will be used for dry crops, but in ordinary years the cultivators would refuse to take water for them because he is not gnaranteed a emply throughout the season. Do you think in a tank supplied from a permanent source we should find the same difficulty in disposing of the water P—1 should say there would be.
  - 122. Q. If we could get the capply from a permanent source would the people begin to use water is ordinary source would the people hegin to use nater in crdinary years for dry crops; supposing there was plenty of woter, more than they could use for first class crops?—In the case of n tank containing perennial storage I doubt if the water would be used even if the sapply is gunranteed. For juari only one watering is required and the cost of leeding the water up to the fields is considerable and would have n deterrent effect.
  - 123. Q. Yes, but if from the same cut he could get soveral waterings, is he likely to use the water?—For one watering it costs Rs. 4 to Rs. 5 for meking channels.
  - 124. Q. Though the cost would be the same whether he took one watering or half a dezen?—He would rather have one watering.
  - 125. Q. You don't think that on a tank where the supply ie liable to failure, the people could be induced to use the water by making the supply permanent instead of uncertain?—I don't think there would be much difference as regards their taking water from n tank with a limited or a permanent supply.
  - 126. Q. Supposing you have n canal, with plonty of water and a permanent supply esserted, which commands a large oul turnble area, what would be the maximum proportion of high class crops likely to be grown on an ordinary Deceau tract, supposing that you have mnauro and labour?—Probably not more than it would be under high class crops in an ordinary Decen tract
  - 127. Q. You told ue is Gujarat that one mot on an ordinary well would irrigate 2 to 2½ acres in ordinary years or twice that in bad years if the water lasted out, would the same figures apply to the Decean ?—With Decean wells 3½ to 4 acres may be irrigated at one time. The area, however, would not be doubled in a bad year, but would be increased.
  - 128. Q. You would not double the area in the Decean in a dry year?-No, the wnter in the deep nlluvin wells of Gujarnt does not sink soon. In the Deccan the wells sink sooner than in Gujarat.
  - 129. Q. Many of your best well tracts are in black soil; is the black coil more than 3 feet deep in the Deccan ?—The black coil is 3 feet or 4 feet at the most. At this depth it can be irrigated. If it is deeper the soil deteriorates with watering. As a matter of fact there is loss on wells in such lands.
  - 130. Q. Can you tell us the cost of repairing a well in the Decean F.—I cenuot give the figores. The people do not bove to do much in the way of repairs besides silt clearance,
    - 131. Q. A well does not need much repaire ?-No.
  - 132. Q. You speak in your note of the ray at being prevented from using caual water when the crop is in danger of

drought owing to permission to take water being necessary. Have you seen the results of this at any time. Have you eny personal knowledge on the subject?—Yes, I have seen the results at Poona near our farm. In 1899 the people did not apply for water till they actually saw their crope withering; thea they applied for water, but could not get the permissian in time to save their crops. On the Kirkee Farm we had a kharif crop and three waterings were found necessary. We wanted a first watering at once and ue took it, formal sanction being obtained afterwards. The crops grown compared favourebly with those of ordinary years and as market rates were high were worth double as much so usual, while all the oreps round about perished.

- 133 Q. (Mr. Muir-Mackenzie)—Do I understand that you got the water before you got the sanction ?—Yes; if we had waited for the permit the farm crop would have been past saving. We got the water by arrangement with the Canal Department and got the formal sanction after-
- 134. (Mr. Ibbetsen) I understand that you know as a fact that other people did apply for water but were so late in getting the permit that the crops died P—Yes that is so, but they waited till the last minute before opplying.
- 135. Q. As to your proposal not to give canal water for cane unless a man digs a well; so it not waste of water to give canal irrigation to o field already protected by a well?—The profits from canal irrigation are found greater in the case of expensive crops than from wells, so the cultivator takes cond water for vive months and uses his woll for the remaining three.
- 188. Q. But why allow bim to do so ? The area ho cao cultivate is limited by the enpacity of the well, so that he can irrigate it from the well all the year round ?—I should like to see it done in the new canals.
- 137. Q. These bandharas which you recommend to be extended; would you boild masonry dame or would you ollow the people to build kachcha dams and let them be washed away in the monsoons?—I would let them build them as they like. Big bandharas built with masonry would be more substantial.
- 138. Q. If Government built the bundharus it would charge for the water, of course ?—Yes.
- 139. Q. Do you think the people will begin with kachcha bandharas first and when they get used to them they will build pakka ones P—Yes, Government might build the pakka ones, but there would be no necessity for this if Guvernment do not charge for the water.
- 140. Q. You propose that the water should be given free charge?—Yes, I would like to see each talnka carefully charge ? and thoroughly surreyed. Any costs incurred in emveying ruight, I think, be charged to the caltivators.
- 141. Q. If all the bandharas possible were made would they irrigate anything like the area commanded by wells?—The area nuder bandharas would be small compared with the ares under wells.
- 142. Q. (Mr. Muir-Mackenzie)—Do you think that money could be usefully speat in extending the number of tals ?—I really bave not sufficient experience of tals to give an opinion. You ought to necept local experience give an opinion. You
- 143. Q. In Ahmedunger did you notice whother the land behind the tale had given crops ?-I did not notice them particularly.

WITNESS No. 74 .- Mr. GOPAL RAYJI TILAX, Retired Executive Engineer.

Mr. Tilak,

Answers to printed questions.

- 2. There is only a small portion of lead protected by irrigation works of all corts in this district, probably not greater than \$\frac{1}{2}\text{op}\$ of the total caltureble areo. The soil of the district is either black, red, or marmy and to a omall extent alluvial, and is almost wholly dependent on rainwater. Besides the small area under well and other irrigation, there are patches of land here end there on the banks of the Krishan and its tributaries, which derive benefit from inundations during rains. Rainfall in this district varies from 20 to 36 inches in good years. In years of scarcity it is below 20 inches. During south west monsoons, when the fall is regular and sulficient, there is no demand for water for kbarif or early crops. The rabi orops, however, require cold weather showers from the east from September to November. Gauden crops require waterfrom September to November. Gaiden crops require water-ing once in four to eight days according to the nature of
- 3. Black coil is bard when dry, but when wet or scaked in water it becomes soft oad yielding. It inffords a medium impervious to water when moist; when exposed it is limble to shrink and crack. Small tanks constructed in black coil hold water. They, however, require clearing of sill from time to time and removing my babul or other trees growing on the dam. It would not be safe to construct bigb earthen dams solely with this soil even when cupplied with maconry core walls. Black coils generally produce rahi crope, and require seasonable showers in the beginning of culd weather. The average rainfall may be all right, but if the tall be not in season crops in black coil may fail. Construction of tanks for cugh soils is not as impertant as for other classes of soil.
- 4. There is no old tank at Mamdapur near Bljapur, con-etructed during Mahomeden rule and serves to irrigate

about 100 acros of paddy or other lands. The olay other tank in this district is the tank at Muchkundi near Bagalkot, constructed in 1882. It has a masonry dam about 300 feet long, and 60 feet maximum height. This tank also serves a small area, but owing to some emise or other it has net yet proved to be a success, and cannot be depended on during years of drought. There are two other irigationt tank works in progress in this district as favance works, viz., the tanks at Sangogi and Hullur. They are both to lave earthen dams, and whom campleted are likely to prove a great baon to this district. The main river pasing through this district is the Krishna with its tributaries Chappeebha and Malprabha. The river, which has only a small flow in the hot senson, is about half a mile in width, and has high banks. The country about the banks is closmall flow in the hot scason, is about half a mile in width, and has high banks. The country about the banke is clovated. Under these circumstances it is highly improbable that its water can be used for permanent irrigation. Something, however, may possibly be dood to take advantage of the high level of water in the river during the rains. It may be stated that when there is failure of rain, and probably famine in this district, there are generally high and sometimes extraordinary doods in the river Krishan and its tributories. tributaries.

7. I do not think there are mare than 1,200 irrigation wells in this district and that each well on an average irriwells in this district and that each well on an average irrigates more than four acres of land for garden or other crops in ordinar; years. In the years of drought the area would be still less owing to low water level in the wells. So far as I am aware, no higher assessments are charged for hads irrigated by new wells constructed at rayat's own cost. It is both possible and desirable to stimulate the construction of new wells by liberal advances, and inducements from Government. Wells are cometimes failures, and it would perhaps be desirable to select for their sites partienlar banks of nallas where water is abundant, and in the first instance to construct kacheha wells at small cost, and when they are successful to turn them icto permanent wells. A large number of wells failed during droughts from 1807 to 1901. Where subsoll was mornen they have been deepened with advantage. The average depth of water below surface ranges from 20 to 30 feet. When the water level is below 30 feet, working of the wells hecomes costly. The cost of wells depends on their dismeters (when they are circular) or square area, depth, nature of sub-soil, cost of metericle and the kind of accutantion read. cost of wells depends on their diameters (when they are circular) or square area, depth, nature of sub-soil, cost of materials and the kind of construction used. For a well 10 to 12 feet diameter and 25 feet deep with dry stone stelling, the cost need not be more than Rs. 300 when the stone is within easy reach. For large wells 20 to 25 feet square, the cost may be 1k. 2,000 to Rs. 3,000. In land murniny soil requiring no stelling, except for a few feet at top-said below most, the cost at large wells may, according to its size and energy of springs in it, irrigate from three to twelve agrees of land.

- 8. In this district there is hardly any complaint of oxees-sive moisture in the sub-soil as far as erops are concerned.
  - 9. Relief labour was employed in the recent famine on-
    - 1. Roads.
    - 2. Road-nactalling.
    - 3. Irrigation tanks.

I do not think much has been done in the way at construction or repair to village tanks. The two irrigation works, viz., the tanks at Sangogi and Hallar, at present in progress as famine works, should, in my opinion, be continued and completed as ordinary works, not only to save from waste the large amounts already spent on them, but to serve as protective works during possible famines in future. Both the tanks are said to have large catchment areas of several square miles and to command extensive areas for irrigation under them. There is only one fear, and it is that the tanks in black soil districts are likely to be filled up with allt in course of time. This point, however, may have been fully considered in fixing the position of the outlet channels in the preparation of the projects.

# A .- GENERAL.

Question 1 -Tho neswors hellow refer to the Bijapur District. I have served in this district as Assistant Engineer, Public Works Department, about nine months during the famine of 1870-77, and for a further period of

about ten months from 1881 to 1882, and have, since my Mr. Tilak. retirement from Government service on ponsion in January 1895, resided here, ongaged in agricultoral pursuits.

7 Jun. 02.

5.—Leans under the Land Impravement Act ure to usual extent availed of by the people for irrigation purposss. The reason why they are not freely taken is that the oultivators do not care for irrigation in years of plenty, and when a drought comes they are nleady reduced to a state of poverty and helplessness and have no heart or energy to start a new undertaking, with the details of which they are not fully acquainted. Only rayats of means think of well-irrigation chiefly to produce green grass and fodder for their bullocks, the pinch of the famine being first felt by the live stock. To encourage well irrigation a beginning may, I think, be made in a good year, concessions heing offered to myats under one or the other of the six sub-heads to this question according to circumstances, and progress watched by the Revenue officers during their tours of inspection.

#### L.-Wuss.

34.—(1) The average depth of permanent irrigation-wells in this district is 25 feet in alluvial soils on the banks of nallas including about 5 or 6 feet depth of water and 35 feet in hard soils on sites at some distance from the nallas, including about 8 feet depth of water.

- (2) The supply is from perculation in alluvial, sandy ond soft muramy sab-soils and both from porcolation and springs in hard soils.
  - (a) In an ordinary year wolls keep up their supply and the water is sweet.
  - (b) In a year of drought the supply semetimes fails, but the water does not necessarily become too saline to use.
- 13) The average cost of construction of wells with areas not exceeding 150 square feet and depth 25 to 30 feet is from Rs. 400 to Rs. 500. Large wells about 20 feet to 25 feet square, and 30 feet to 40 feet desp cost from Rs. 2,000 to Rs. 3,000.
- (4) Wells when properly constructed, may last more than
- (5) The water is usually raised by means of n loather bucket (met), ropes and wheel, worked by a pair of bul-
- (6) Small wills command an area of 4 to 8 acres; largo wells with 2 or more mots 8 to 16 acres.
- (7) A small well irrigates on an average 4 nores of land, while a large one about 6 neres.
- 35 .- Well irrigation in most parts of this district is in its infancy and is merely a useful appendage to other valun le lands, serving in years of searcity to supplement fodder of good quality to a small number of selected live stock. It is not, as a rule, resorted to as a separate avocation, and is not n paying concern when all costs are taken into account.

36.—An nero of irrigated land with sugar-case, plantnia, or other valuable orop may, under favourable oirenmstances, yield a produce worth about Rs. 50 against Rs. 4 or 5 of similar land depending on rain water. Much, however, depends on experience and skill and lastly good luck of the man emplayed, as the crops are sometimes subject to the rayages at the hands of merciless thioves.

- 87 .- No higher rate is charged for well irrigation.
- -Serious difficultles are encountered
- (1) In the selection of a spot in which nample and last-ing supply of water is found. Wells whon first constructed often yield plenty of water, but whon worked for a fow mouths they sometimes full. In same cases excavations have to be given up as hopeless, as no signs of nearness of water appear or haid rock is mot.
- (2) Difficulties occur in the construction of a well when the excavation has to be carried through sand or other treacherons soil. Square wells built in such soils at great east snartimes full down, and to re-build them is a tedious task.

No professional assistance has, to my knowledge, over been either rought for by the parties concerned, or offered by Government or local bodies. It would be on advantage

Mr. Titak, if essistence ie respect of expert advice, trial berings and the nes of bering tools and pomps be within the reneb of 7 Jan. 02, well-to-do mysts wishing to undertake well construction and requiring such assistance.

-I am in favour of construction of wells in private 39.—I am in favour of construction of wells in private lands by Govornment, in special cases, as models in spects not yet tappod. I think a regalar servey of large nallahs for some distances from their juection with large rivers will have to be made for this purpose and plans propared, showing nuder-ground water levels at erory 4th of a mile to a depth of 25 fest from the sorface of ground. The model well should be safficiently deep to held water daring years of drought, and its construction should be as soand and economical as possible. The success of this well mey

- be the means of eacouraging well-to-do people to build others in their own property. People may be allowed free oss of water from this well for irrigation purposes at least for a few years.
- 40.—Temporary wolls are used in this district us a fororunner to permanent ones. They are also reserted to in years of drought. I would encourage their coestruction in a year of scanty rainfall by effering to supply from public fands, free of cost, all uppliances and materials, such as wood-work for support, stone for the trough, leather bucket and wheel, stc., leaving the execution only to the oultivator. These wells will prohably cust Rs. 50 esch, including materials and will, with small repairs, last two or three years.
- 1. Q. (The President).—You are a retired Executive Eagineer?—Yes.
- 2. Q. You were Assistant Engineer doring the femine of 1876-77 and yen retired in 1895 !-Yes.
- 3. Q. You are a landowner; where is your property site of the Muddebital toluka of Rijapar.
- 4. Q. With your knowledge of this district what do you recommend as the best means far preparing it against another famine?—Well irrigatioe should be encouraged in the first instance. Bot there is another suggestion which I would like to propose and which I think has not been mentioned by any other witness. The new method I would propose is that each village should keep a small stock of grain and in a year when the quantity of rain is very small u little of it should be given to supply the immediate wants of the people. In this district crops fail for the want of one tincly shower of rain. The full of one shower means presperity; the failure of one shower leads to misery. The people ure seldem prepared. Their immediate wants are fodder and groun. If there was a stock to last even for two ments they would have titee to think of what they might do. At present their stock just fails in a feating year when they want it most and they have no time to prepare for contingocies. I think that just as Government spends money on relief works they might spend some is the way I suggest. 4. Q. With your knowledge of this district what do you
- 5. Q. Would you make the rayats pay for this grain or would you take it out of Guvernment dues?—I suggest that part of the assessment should be taken in kind, two manas part of the assessment should be taken ic kind, two manss from the annual assessment for grain and one anna for fodder for two years only, and this should be kept in the village. It would be just like Government keeping a large cash balance. There will be a certain amount of grain and Government could turn it into money, only the interest would be lost. This would be distributed amongst the various villages nod each village in two years will have about its. 500 worth of grain. There are special sites in many villages for storing grain where it could remoie without damage for tee years.
- 6 Q. What woold yan do if you had it there for two years and no one wanted it?—Corn lests without lesing may of its good qualities for two to four years and I should ask the rayats far whom I store this grain to change it for new grain every two or three years.
- 7. Q. And fodder ? What about that?—Evon fodder can be kept.
- 8. Q. Do I onderstand you lo say that this store woold be given out in times of famine and drought just as now we give out payment for familie labour?—Is a year of drought I would distribute it only to the poorer people.
- 9. Q The rayat pays his assessment in cash as before and receives back a certain sum undirectly to help him in times of distress?—The rayat would have to pay 14 anums in cash and two nonas in giain. The latter would be issued by Government as a loan inhard times. What happens at present is that the poor rayat goes to his neighbour, and if he also is in want he goes to the Sowear who domands two bags of juari for the one he lends, when the crop is barvested. If the crop is a good one the man can easily repay two bags for every one bag he hes taken, but if it is middling be

- cannot afford to give two for oce and he is werse off than before if he gets no crop at all and cannot return the load.
- 10. Q. You want the Government to be a sort of corn banker P—Yes, I have heard one objection to my plan, and that is that it will be difficult to keen a watch over the and that is that it will be difficult to keen a watch over the grain. In this district there are grain pits six or sevee feet below surface and it is not possible for robbers to get the grain out of such pits in one night. It takes at least twelve hours to get down to any af the pits nad even if the pit is exposed it takes a lot of time to get the grain out as the month of the pit is very small. It is an excavation in bard maram of X of of globular form at the bottom and reclosed to a fannel at the top. It requires no cover other than a slab and no gnard and would be outside the villages. The village authorities might, I think, be held responsible for the safety of these grain pits and fodder streks. The storing of fodder would result in the preservation of a certain number of head of caltle which are required for the oultivators' operations.
- 11. Q. What is the hest way of raising crops in a famine year? By wells in this district; lorge tonks would also be n good meons.
- 12. Q. But you here a large tank and no one lokes any water from it. Do yoo know the Much kundi tank; that irrgates only 40 acres although it could irrigate coosiderably more?—I here seen the tank. I had only one or two water supply projects before u.e when I was in the service.
- 13. Q. You know the Sangagi and Hullur tanks; how much isoney has there been spont on them?—Aboot Rs. 80,000.
- 14. Q. How much remains to be speet?—Only the ex-
- 16. Q. Supposing ordinary labour had been pot in the tanks instead at famine labour, would its 80,000 bive been spent ?- No, only about 4th of that sual.
- 16. Q. You say temperary wells can be made for Rs. 50. What can you da for Rs. 50?—We can excavate a pit 20 to 25 fort deep for Rs. 50.
- 17. Q Will it last lung ?-It might last 2 or 3 years, if there are not heary mias.
- 18. Q Do you find water at 20 feet ?- Yes, un banks and
- 19. Q. (Mr Muir-Mackenzie)—Here you any tale on your lands; and du you ind that your lands are protected by these tale and that you get better crops by means of them in years of drought?—Yes, there are tale on my lands; I get better craps only on these portions which go under water.
- 20. Q. Is that a material portion ?-About 10 per cent
- 21. Q Why do you build your tals ?-To prevent the water from running out and to give muistore to the fields.
- Q. Does it give you a better crop in ordinary years? -When there is pleuty of rain they a shot of much use, but in those of drought tale are very useful.

# TWENTY-NINTH DAY.

# Belgaum, 9th January 1902.

WITNESS No. 75 .- MR. RUDBAGAUDA CHANVIRGAUDA ARTAL, District Doputy Collector, Belgaum. : - Answers to printed questions. I.

2. Cultivable and Irrigable Area.—The cultivable areas of the Bolgaum District is 2,224,283 acres.

The fallowing are the proportions of the cultivable areas to irrigated areas :-

## Area irrigated from-

						Acres.	por cent
	Government canals				-		r '20
	Wells					29,695	1 33
	Tanks	•	•			. 9,079	•40
,	Other sources	•	•	•		. 6,899	34
			Tor	AL		50,180	2 25
•							

The character of the soil is Masari (red), Karla (clayoy leam) and Yari (black).

Rainfall.—Near the Sanliyadris the rain of the south-west meason is very constant and heavy (Belgaum and Khanapur). Further east (Chikadi, Gokak and Sanngaan) it is fitful. The eastern talukas shaw a fitful fall, but this is supplemented by a seanty supply from the 10 th-east monsoon (which comes generally in October or later). Ordinarily there is no domand for water in the sauth-west monsoon. The crops which generally require irrigation are sugarcane, betel loaf, turmoric, onians, garlio, vegetables (root, leaf and pod), plantain trees, "Javi Godi," etc. They require watering once a week or once a forinight at least. The area under a crop is divided into parts each of which is watered ut a time. The irrigation revenue is generally reviized in the form a cansolidated assessment in the case of tanks. In case of canals of continuous flow (Gokak canal is the only canal of this nature in this district), the revenue is levied in the form of a separate water-raie. Rainfall .- Near the Sanliyadris the rain of the southwater-rate.

3. Black Cotton Soil.—As far as I know, black cotton soil is of little use for extending irrigation. Ordinarily the gardon crops, such as online, garlie and a few vogetables, may grow, but for betel leaf gardons, for plantin trees, otc., which require ample water, the soil is useless.

Small tanks constructed in such soil hold water only for a short period—say, till the ond of December, unless early rains are heavy—and it is not at all sufficient for an extensive irrigation. Generally the water is used by mon and cattle for drinking. High earthen bandles are dates cannot be made of such soil without masonry core walls, inless perhaps the dams are very wide at the base.

Black soil has a great moisture-retentive power and hence there is no demand for water except in case of prolonged drooght.

There is no derire on the part of owners of black soil for irrigation.

4 and 5. For the description and the number of irrigation works I have nothing to add to what is so olaborately described in the pages of the "Bombay Gazetteor," Belgaum, Volume XXI, pages 210 to 241.

O. I haro not the requisite statistics of the district or village warks. Government have not as yet clearly been given to understand the extent of their responsibilities to unaintain these works. No settlement report gives any information about these. In a year of seanty minifall these works naturally fail to be as useful as in ordinary years; yat I do not think that any remission has been granted or claimed by the rayats. The case of Gaddikeri at Magutchan-Hubli may be mentioned as an example. The District Beard have not done any irrigation work. The Local Boards, as at present constituted, will not, I think, be able to undertake these works will be greatly increased if more money and greater attention to their up-keep he pald than at present and a few rules be made for this purpose. It will not be quite uncustomery if the rayats who are directly benefited by these works be made to work or provide labour for their ordinary repairs or clearances for three or four days during a year. Their value for demostle purposes depends upon their situation. 6. I hare not the requisite statistics of the district or vil-

7. I have not the statistics to date. The opinion I hold respecting the wells is given in nuswers to another set of qo estions.

8. No drainage work is necessary in this district.

9, 12, 18 and 14 I have not the requisite statistics to enable me to answer these questions with uny degree of acentacy.

I may add that the works on which relief labour was generally employed in this district were read and earthworks and motal-breaking. I think that of the works reunining uncompleted, those of Saundatti-Dharwar and the Murgod-B il Haugal Roads require early completion, as otherwise it will hinder the traffic between the places and the works will prave of no use to the public.

#### II. A. General.

1. My answers particularly refor to Parasgad, Sampgaon and Khanapur Talukas of the Belgaum District and generally to similar tracts of the rest of the Belgaum District and of the Dharwar and Bijapur Districts. I have visited several places during my last 25 years' service in the capacities of clerk, Deputy Chitnis and Chitnis to Collectors, of Natire Assistant to the Cammissioner, S. D., and of a Divisional Officer. Besides, I one paddy fields in the Dharwar District. I have also seen almost all the tanks in the Belgaum, Dharwar and Bijapur Districts.

2. The rainfall varies much in different parts of the three talukas. The average for Sampgaon which is situated hetween Khanapur and Parasgad is 29 89, that for Parasgad 24.78, and for Khanapur 67.27 luches. I was oble to collect figures of the average rainfall in each much of the year for the Sampgaou Taluka only. They are as follow:—

Avorago of 10 years from 1891 to 1900.

						тпопоз.	COMP
Japuary						1	Yil.
February						0	5
March						0	33
April	·		,			2	41
May	•	·				2	41 61
- Jnno	Ī		·			5	55
July	•	·	-		·	5	55 32 88 25 89 58
August	•		-			3	8B
Soptombar	·	-		·		3	25
October		-	·	·		4	89
Novomber	•	•	:			Ó	58
December	•	:	:		:	Ö	9
				_			
				To	tal	23	96

- 3. The circumstances and conditions of the talukas vary so much that the same reasons do not apply equally to all parts of the same talukas. Obstacles Nos. 1, 2, 3, 6 and 7 do not exist in any of the talukas. Unsuitability af soil is not with in the Parasgad Taluka. Only in the deep black soil continuous irrigation has not proved advantageous. The fith abstacle exists in Sawpgaon and Parasgad Talukas, while in the Khisoapar Taluka the rain is generally seasonable and sufficient. In the case of irrigation by erecting dance across nalles, this obstacle is less as the supply of water lardly runs short in an ordinary year. Obstacle No. 8 exists in aliemated villages in which the Inaudar has power to rack-rent his tenants. I think that a law providing the maximum rent to be recevered from the natual tillers of land may be onacted in case of alienated villages. Among "other reasons—(9)" the prominent ones are want of expert opinion and lack of capital and unity nurse the oultivators to utilize improved means of irrigation.

  4. I do not know of acy such exemption granted. (3) 3. The circumstances and conditions of the talukas vary
- A. I do not know of any such exemption granted. (3) Nearly all the towarts in my charge are tenants-at-will and they do not effect any material improvements in irrigation at their own cost. (i) Section 107 of the Land Revanne Code adequately protects against any future enhancement of revenue, having regard to improvements offected in any land during the currency of any pravious softlements at the cost of the compact or the holder.
- 5. The leans are applied for frequently, yet I found very few cases in which any extension of irrigation was really

Mr. Artal. attempted. I can, however, give one example here, that of Sir Dosai of Shirsangi, Taleka Parasgod, who has 9 Jou. 02. constructed by the sid of a tegai grant of Rs. -75,000 a large tank near Shirsangi is order to extend irrigation to lands in two ur three of his Inam villages. This is, of course, a case of a big laudholder. But to create a real testo for irrigation among the ordinary mynts I would propose that in selected villages special measures for the encouragement of these loans should be adopted. It case of new lands brought under irrigation by means of wells only interest at a lower rate, say of 3 per cent, may be charged, and if through a deficient supply of water or for other good reason the undertoking proves a failure interest other good reason the undertoking proves a fallure interest may be remitted altogether. The period of repayment does may be remitted altogethur. The period of renayment does not indinarily call for any extension. I would also propose that in case of tanks remission of interest may be granted in a particular year in which crop suffers for want of indequate supply of water. I am af opinion that special encouragement by means of grant-in-nid or otherwise may also be given in esse of large and speculative works, such as large tanks, wind-mills and utilization of river or of strong water by means of machinery, etc.

- 6. I have not come neross an inclance of this kind.
  - (3) The oultivoturs of course want the means of irrigation extended provided the cost is not probabilitie.
- 7 to 11. There are no eanals of continuous flow in this chargo.
- 12. After the cessalion of rains small earthen doms are 13. After the cession in rains small earther dains are thrown across some perennial nalles at selected sites and water is let into the fields by means of channels. In the Khanapur Taluka, where the early rains are certain, sugarcane plantations are fed by water baled out from these tomperary resorvoirs. The doins are generally washed tomperaty resorvoira.
  - (3) The period depends upon the nature of male and the crops raised: in a year of number rainfull the supply lasts till about the 15th of March. In a year of scanty rainfall it lasts till the end of November, and in a year of drought there is searcely any water outliebent for irrigation |mrpover
- 13. The mode of irrigation described above enables a cultivator lo raise valuable crops, such as engarcane, garlie, entons, green regetables, etc. In a year of senaty raisful green fodder or its substitute, maire, etc., is raised. These lands are generally of a mediam quality. I cannot give with accuracy the value of the irrigated and unirrigated crops.
- 14. As an irrigated erop mainly depends upon water, the entire crop withers as the supply of water ceases or if it eannot be properly maint dired.
- 15. In the case of garden lands brigated by means of canals described above the irrigation is almost always supplemented by wells, particularly during the period from March to June. In the case of sugarcane crop raised in the Khanapur Taluka well nuter is never used.
  - 16. I cannot give figures.
- 17 The conals I have described are not many and none of them are more than 300 or 400 yords in length. The owners of the fields ore generally the awners of the canals. Government have fixed a consolidated assessment on these Linds. It is for the Survey Department to mention what amount of irrigation rovenne has been levied. The farmer or the owner generally gets i to irds of the gross produce on the land netually irrigated.
- 18. The expenditure necessary for the kind of irrigation is the cost of dams which varies from 10 to 50 rupers and the charges for the up-keep of the channels which the tenants mainlain.
  - 19 Nn such instance has come to my knowledge.
  - 20. Tide answer to questions 17 and 18.
- 21. All these cannis ar daws are constructed by private persons. Disputes with regard to them are very rate.
- 22. I am of opinion that construction of these canals or 22. I am of opinion that construction of these canals or olimneds should be encouraged as much as possible and proper recard kept of them. If possible, dams may be creeted pakka with a large sluice for the ruin water to escape during the mensoon. At present the grantest defect is that no records of such warks and of the lands irrigated by these means are kept, and the supply is not well regalined. I think Government should easist the cultivature by arrelation the surface of a replacement was a story of some providing the services of a professional man who should take level and inform the cultivators whether water from a selected spot could flow to his field, etc. Besides this,

Government can remit the water-rate leviable under Section 55 of the Land Revenue Code and give advances without interest. It so hoppens, particularly in years of drought, that a riparian occupant cannot obtain in time the permission of the Collector to use the water, and the consequence is that his crops fade away and parch. I think that in such cases the people may be allowed to take water freely and save their crops. In such cases the Collector chould issue general orders permitting the free use of such water.

## D.-TANES.

23. Tooke oro made by bonding or arresting the flow of n nello or a watercourse in a convenient place by means of conthon dams creeted crosswise. The site is generally such as to command the largest cotchment area and is an a high level, so that water from it may flow easily to all the lowlying laads. Each tank is genorally provided with one or two sluices which supply the fields with water. One waste woir which gives passage when the tank is full and one main conduit which supplies the tank with water from the adjoining country fulfil the requirements of an ordinary irrigation tank.

No perennial irrigation is carried on under these tonks. They are intended to farnish the paddy crops with water when the rains hold out, and in case the rains be number to provide water for sugarcane cultivation in the munths of March, April, and May.

In a year of ample minfull the water is generally used for sugareans erop which requires from four to fru materings with an internal of about a fortnight to 20 days between every two waterings. The supply therefore is undo to lust till the end of May. In a year of scantr cain the water or part of it is generally used for growing paddy erop and thu area for the sugarcane crop is prepared to a small extent only. In a year of drought the water does not suffice for the early paddy erop.

The area irrigated varies according to the capecity of a tonk. The minimum area may be taken as 5 acres and the maximum I met with in this charge is about 337 acres in the case of the Galdikeri Tank of Magnithan Habil.

- 24 and 25. Tide answers to Questions 23, 13 and 14.
- 26. The irrigation is not supplemented by irrigation from
- 27 and 23. The replies to these questions are the same ususes given for Questions 16 and 17 above, except that the enlievator pays for the entire irrigable area.
- 29. The only private anatal expenditure is the upkeep of out silt from the waste water channel, couldn't, such ustaking out silt from the waste water channel, couldn't, etc., are done by the tenants, but repairs la dam, alute, elc., are generally undertaken by the landlord or Government if extra assessment is charged.
- 30. Tunks which are not the private property of individnuls are separalely surveyed and shown as such in the village records. The procedure fullawed in case may repairs, are found necessary is generally as fellows : if needs repair the rayuts concerned petition to the Collector, who forwards it on to the lixeculive Engineer for consideration or disposal. Sometimes the Executive Engineer. who forwards it on to the Executive Engineer for consideration or disposal. Sometimes the Executive Engineer, receives such petitions direct. But in any case the Collector is referred to with regard to the callection of the D per cent. contribution. If the contribution is reserved the Executive Engineer, who has already prepared his plan and estimate, submits his proposals to the Soperintending Engineer for station or approval and the work is then executed. Now according to the present system of leving the 10 per cent contribution from the rayats, it so happens that in most cases the centribution is not paid by the mysts in time awing to disagreements among themselves or to their inability, and the resolt is that grants for repairs often lapse. In other cases though the rayats pay their contribution promptly, yet want of necessary funds or provision in the budget deloys the undertaking of the repairs, etc., by Government. In any case the rayats become the losers. I do not see why the rayate should be required to contribute towards the repairs, etc., af tanks when they are already sufficiently taxed in the shape of a consolidated assessment for using the water of a Government tank. The fair way would be to keep the munagement of such tauks entirely in the bands of Government and to incur whatever expenditure be necessary to keep them in proper order. My views appear to be in accord with those of the Tank Committee which sat in 1891, and which also prescribed coughly the amounts that would be necessary for the repairs of tanks in the Beignum, 1893, and which also prescribed roughly the amounts that would be necessary for the remires of tanks in the Belgaum, Dharwarand Kanara Districts. According to the opinion of the Committee Rs. 1,40,000 was an adequate sum for expenditure on repairs of tanks in the Belgaum District, vide

Government Resolution No. 34-W.L.419 of 5th March 1895 (Public Works Department)

According to the present system the rayats who are expected to take the initiative in the matter are always dilatory for want of unanimity or of means to pay the contribution, and so the repairs which Government undertake are not regular and systematic. There is no accurate record of the area irrigated from such tanks from time to time and of the turns or modes in which an individual cultivator chould utilize the water. There is no record at hand of extra assessment recovered on account of each of such tanks. The consequence has been that many of the tanks have got silted up and on account of dispute among the cultivators proper repairs are not effected. An improvement in all these respects seems, in my opinion, necessary.

- 31. No tank of any considerable size has been constructed by any private person except by the Sir Desai of Shirangi near Shirangi. The tank is estimated to irrigate about -1,000 acres.
- 32. For the successful nnl good growth of paddy or other late crops in those fields it is essential to have these tanks in good repairs. The only fear is that if they be too near n village the weather is likely to become unlavious by the growth of rank regetation therein. The way to encourage their construction is to advance leans free of interest.
- 38. From the description of the tunks it may be seen that they are liable to get silted up enouyear. I have not ascertained the depth of each year's silt. Some of the tanks have become eilted up daring the course of 20 to 25 years. In one or two cases I have noticed that a silt of shout five feet has been deposited during a decade. No dredwing is resorted to; but when the tanks get dried up in the hot weather the silt is removed and thrown on the dam or used as minure or for bricks, etc., and the bed despende. In a year of drought these tanks may be adequately deepened and famine relief provided.

#### E .- WELLS.

- 34. The talukas I write of may be apportioned into-
- (1) Mountainous truot—bounded on one side by the crest of the Sanhyndris and on the other by n northsouth line drawn along the Khanapur-S.pa Rand.
- (2) Hilly tract to the oast of the above trust lying between the Khunapur-Supa Read and the north-en-t line passing through Deshaur, Purashwad and Mugntkhan-Hubli.
- (3) Undulatory tract to the east of tract No. 2 bounded in the east by a similar line drawn through Inchal, Bail-Hongal and Belavdi.
- (4) Sandstone hilly tract which interposes here and there and contains pubbles, lateries, stones, etc. This soil is inferior and very porous.
- (5) Black soil plains nuderlaid with shingle, limestones or any other hard sub-strata.
- (6) Deep bluck soil plnins.

The characteristics of the different tracts vary mach. In tract No. 1 no irrigable land sxiste. In tract No. 2 tanks and the impounding of water of nallas are the moans used. Welle can be sunk but only in law grounds which are in many cares rice fields. The soil below is trencherous; as secon as a spring is tapped it gives way. Consequently it is very difficult to build pakka wells in this tract. Tracts 3, 4 and 5 are suitable areas for irrigation. Wells are generally sunk along a nala or watercourse in low ground. The underground is of trap, ilmestons or soft murnm. Water is fairly good and well adapted for irrigating the fields. Tract No. 6 cannot, except at a very henry expenditure, be irrigated by wells.

The depth of a well varies also in different tracts. In tract No. 2 it is about 10 to 20 feet. In tracts Nos. 3 and 5 it ranges from 12 to 30. In tract No. 4 it is very uncortain; in some cases it is 10 feet, while in other places

it may be about 35 feet. In tract No. 6 the depth ranges Mr. Artal from 40 to 120 feet.

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All the wells get their supply from springs, which in n year of drought fail or 1111 short invariably. None of them are liable to become saline.

The cost also varies. In tract No. 2 it is about Rs. 4'.0 while in tracts Nos 3 and 5 it is about Rs. 200 for a kachcha well and Rs. 600 for a pakka. The peer agriculturist generally digs a pit in a hard ground and builds a masonry wall just sufficient to ply his mot safely. Such wells cost about Rs. 200 The same well, if built pakka on all eides, would cost about Rs. 600. For a large pakka well in medium soil the ovet is about Rs. 3,000. The kachcha well lasts for about 12 yeers and a pakka well from 50 to 100 years. Water is invariably raised by means of a mot or leathern bag. The average area attached to a good well is about 2 acres and that actually irrigated about 1\frac{1}{2} neres. This area depends, however, on the kind of crop raised. The sagaroane crop cannot be irrigated more than half an acre by means of a single mot, while vegetable crops to the extent of two mores can be raised by the same means.

- 85 The lands under well-irrigation are generally of a molium quality. Irrigation enables a cultivator to raise crops twice instead of once or to raise such orep as sugarcane. In a year of ample rainfull the yield is nearly seven or eight times more than in the same kind of nairrigated land. In a your of scanty minfull the yield is two or three times more than an unirrigated crop.
- 36. The yield, which of course is charged with exponses of enlitvation, is worth about Rs. 200 if the crop is rich, while the value of the unirrigated crop on the same land is Rs 20 or so per nere. In a year of drought it is about Rs. 75.
- 37. The oultivator generally pays in kind half a chare in the produce of the land. If money is paid it is generally paid at about 50 to 75 per more it the land be good. Government does not receive may extra rent beyond the currey assessment, which takes into account the adaptability of the soil to gardens. The Government rate varies from Rs. 1-12 0 to Rs. 3-8-0 per acrs. These rates are paid on the irrigable area.
- on the irrigable aren.

  3S. The selection of a cite ic generally made by local experts. I do not think that any Government nid would benefit the cultivatore in this matter. In the construction of a well, however, some difficulties are encountered. The difficulties in my opinion are want of good being or blusting tools and materials when the ground is hard, pumping out water, etc. An assistance has over been effected by Government or by any local bedies in the shape of expert advice, trial borings, etc., may be useful where (as in a grent part of the Paraggad Taluka) the rayats entertain little hopes of getting water by sinking a well. I think it would be advantageous if a fixed amount in the Provincial water grant is allotted ununally for experiments in such tracts by means of trial borings by District Local Boards.

Another wny is to keep in stock this improved appliances for sinking wells, and the onlitivators should be succuraged to take a loan of these. At first special facilities should be offered to make use of these by kesping for biro at soms selected convenient centree.

- 32. I am not in favour of constructing Government wells in private lands, because the cost will be more than when constructed by private individuale. The selection of sits will not be made as easily as the cultivators do. The owner of the land may not accept the terms offered by Government. The maintenance charges will be beavy and there will not be a good return for the enpital expended.
- 40. In some of the paddy fields, when water can be had at a depth of 5 or 6 feet, temporary rough wells are dag in ordinary years and by these means second orops are raised. Such lands are very few and are situated in tracte which are practically free from families. Consequently they do not require any special encouragement.
- 1. Q. (The President)—You are District Doputy Collector of Belgunm?—Yes.
- 2. Q. How long have you held that position?—Since Angust 1898; before that I was stationed in Bijapur. I know the Bijapur and Dherwar districts well.
- 3. Q. In paragraph 2 of your memo, you give the proportions of the culturable areas under certain works. The total of 50,180 norss includes 6,899 under the head of "other sources." What other sources do you refer to?—

  Patasthal irrigation from the streams.
- 4. Q It is a large area P—Yes, the advantage is that Patasthal arrigation can be carried on from streams without dams.
- 5. Q. You know something of the bandhara cystem in Nasik?—Yes. The system is very important there: we buys nothing of that kind in this district.
- 6. Q. Is there may reason why there should not be?— The rivers are too deep; and therefore not suitable for bandharas.

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- 7. Q. You say that "an obstacle orists in alienated rillages, in which the lummdar neckerouts his tenants." Have the tenants no rights in these villages?—They have proprietory rights to bold the land; but they must pay taxes to the lummdar.
  - 8. Q. Can he raise it as much as he likes Yos.
  - 9. Q. And is there no appeal ?- No.
- 10. Q. You describe the case of an Inamdar who got a 10. Q. 100 describe the case of an immular who got a large sum of unjuny from Gavernment. Is he a large Imamdar?—Yes, Sir Desii of Shirsangi in the Parasgad Taluka hes spent a large sum of money in huilding a tank. Besides the Rs. 75,000, tent by Government, he has opent another Rs. 75,000 out of his own pocket.

  11. Q. Is it a very large tank?—One thousand acres will be commanded, and much sugarcane will be grown.
- Four Inam villages are commanded.
- 12. Q. Wes it done as a famine relief work?—The tank was condemned by the Assistant Engineer, but the Inaudar completed it by famine labour and it has proved very
- 13. Q. In paragraph 5 of your memorandum you say, "I am of opinion that special encouragement by grants-inmid or otherwise may be given in ease of large and speculatiro works such as large tanks, wind milts and the utilisation of the rivers or streams by means of machinery."
  Have you known at any application being made for taker's
  leaus for works of that description.—For tanks and noils
  there have been applications, but not for works by machiners.
- 14. Q. Were any other applications for loans for lanks recoived besides the one you mention?—No.
- 15. Q Have you had any applications for pomping up writer?—Air. Joyner had a scheme on the Malprabla river at Gardi-hoofir, where pumping might have been done. [Mr. Beale explained that the scheme was rejected as an irrigation scheme. It had never been considered as a pumping scheme].—There is another project at Yergandi near the Golah works.
- 16. Q There are very few tanks in the district compared with other districts There are 400 tanks in Supgaon, 500 in Khanapur, and some in Belgaum.
  - 17. Q. Are they small tanks? Yes, small rice tanks.
  - 18. Q. Is there room for extension of tanks ?-Yes.
- 19. Q. Are small tanks preferred !-Yes, in years of good ramfall the people arrighte came from small tanks.
- 20. Q Do they last all the year round !-Taoy last till the middle of March.
- 21. Q. Is that enough for sugarcano ?-Yes, sugarcano is rown in Tebiu ery.
- 21. Q. Kar'y tain in April will keep up the sugarcane erop. If rain does not come, will not the crope suffer?

  We generally get April rain. We water the crep once and then we depend ou min-water.
- 23. Q (Mr Ibbetson)—I noticed that in your printed memorandum you say, "the sapply, therefore, is made to last till the end of May." Is that not a misprint far March?—Yes; with good rainfall it would last only till March.
- 24. Q. (The President)—Do the people here ever irrigate ease from wells, when the tanks are stry?—In the Chikodi Taluka, they grow cano with well water. The best ougar and is that grown under wells. In 1887 there were 4,287 tanks, but there has been an increase of 50 per cent, and the number now is 6,327.
- 25 Q (Mr. Muir-Maclenzie)—Is that for the Chi-koli Talaka alone ?—Yee.
- 26. Q (The President)-Is there good rain in that talakal-Yes. It is rocky and well suited for sinking wells.
- 27. Q. Is there the same proceedty for irrigation in Athni f.-The Athni, Golad and Perasged talakas are libble
- 28. Q. (Mr. Muir-Mackenzie)—I noticed that thry graw n gond deal of toluteo in Chikedif—The Chikedi entiredors are Jains and they are very expert. The best tabacco is irrigated from wells. The ordinary tobacco depends on rainfall. The best gul is grown under wells; and the whole of this is experted.
- 29. Q. It most be a highly favoured laluka as regards rninfall :- The rainfall is not more than 25 inches. The have streams and the land is rich in water-bruring strains.
- 30. Q. (Mr. Ibbetson)-When do they sow the to-bacco?-In September.

- S1. Q. (The President)—Do you think there is room for a large extension of tanks throughout the district?—The sites are not outable. In the Parasgad taluka it is very difficult to get water.
  - 32. Q. Is that all black cutton soil ?- Yes.
- 33. Q. Do the papel not sink wells in black cotton soil?-No, because, if they got water, it is generally brackish.
- P4. Q. Is the soil deep?-Tho black soil in that district is from o to 10 feet deep in some places
- 3ü. Q. (Mr. Ibbetson)-What is then underneath it?-White soil like ashes.
- 8% Q. (Mr. Muir-Mackenzie) What the Public Works repartment call muram. Yes,
- 37. Q. (The President)—Is the Snappaon taluka liable to famine?—No, it is not, but the coal is soft, and not suitable to irrigation.
- 38. Q. What can you do for the Athni Taluka?-I passed through it: it is very rouch like Juth.
- 39. Q. What can you do for Jath?-Wells could be made there.
  - 40. Q. Could you have tanks? -I do not think so.
- 41. Q. I nuderstand that Athni is the worst taluka in the Presidency P What ran be done for it P-Irrigation from the Krishna is not possible in Athni.
  - 43. Q. What is the reason. Is it too low?- Yes.
- 43. Q. The Tassi lank was given up. Do you think the tank would have been usefulf-Yes. If it had been successful, it would have protected a large area.
  - 41. Q. Is irrigation possible from the Dari river ?-
- 45. Q. Do you think then that wells should be encouraged more than they are?—Yes, wells could be constructed in Sanniatti in the Paragad Taluka. I know the
  case of a man, who has five neres of had, who has onill a
  well there. The assessment is very low, Rs. S. Formerly
  he need to grow juari, but he converted into garden evop
  and was able to let the land for Ks 100.
- 49 Q (Mr. Muir-Mackenzie)-What is the cost of such a well P-Rs. 1,0.M. That particular man has applied for Rs 1,000 to complete his well, and I concluded him a inkavi lom setenlay.
- 47. Q. (The President)-You must have a great number of applicative for takeri. Yes, in a great number of cases they really want money for subsistence.
- 48. Q How long down it lake a man to get a reply to his application?—It depends, it may be 16 days or one month. I think some other section, leading money, abould be divised, such as Agricultural Banks, which should replace the talari system.
- 49. Q. Yes, but do you think the Banks will be nike to recover?—The Builes should be given power to recover in some summary way. I know that Sir Demi of Shir Sangl and Wantmori has lout as much as Rs. 50,020 to the rayous at the rate of Sanuas.
- 50. Q. (Mr. Muir-Mackenzie)—I suppose they have lent it to solvent men?—Yes, they have taken great care about that.
- about that.

  51. Q. (The Prevident)—You say in paragraph 6, "I do not think that any remission has been granted or claimed by the rayats. The case of the Gaddikeri at Mugult-Khan, Hubli, may be mentioned as an example. The District Local Boards have not done any irrigation work. The Local Boards have not done any irrigation work. The Local Boards, as at present constituted, will not, I think, he able to undertake these works. I am of opinion that the Protective value will be greatly increased, it more maney and greater attention to their up-keep be paid then at present, and a few rules be made for this purpose." In whose lands should the Government place them. In the kands of the Revence officers?—I think the Pablic Works Department could look after them better than the Revoce officers, who are overworked. the lierrooe officers, who are overworked
- 52. Q. Gould the Public Works Department give their intention to an all tanks of five or oix never !- Yes.
- 53. Q. There is no science required to repair such tanks. Would it not be better to let the people look after them themselves?—Formerly the outlom was to put three or four tanks in charge of each village and the villagers need to the rich the channels, and look after the lanks. But new that the one-anna cess is loyed, they will not do so.
- 54. Q. Would it not he better to redracthe assessment, and let them do it !-- I do not think so. They would let the

tanks go ta rnin. They would quarrel among themselves. It is better for Government to do the repairs, and raise the usual sessesment.

- 55. Q. Do you not think it will give a deal of trouble to Government to repair a large number of small tanks ?—I suppose there are only 30 or 40 tanks.
- 56. Q. (Mr. Ibbetson).—If the villogers did the repairs before, why did they not do them now?—The people are better infarmed now.
- The President read the following extract fram a paper cubmitted by witness on the subject of silting up of tanks.

# "(1) Baswannas Tank behind the Dharamsalla of Sampgaon.

The nrea of the tank is 16 neres and 32 gnntas and the area irrigated 17 acres and 38 gnntas. In years of ample rainfall, the tank has water up to February and rayats make use af it ones in Angust, if rain he nat sufficient and ones at the hegiuniag of October when the paddy crops come to core. Na repairs appear to have been dame to this tank by Gavarament. It is in a mast dilapidated state. Water stands only in one-third or so of its nrea. The rayats spend money only on removing silt from the low portion of the tank near the sluice. These repairs they do of the cost of 8 or 9. kudos of juari after an interval of eight ar ten years. The tank does not appear in the list of irrigation tanks.

- (2) Angdevarkari-
  - (a) Sampgaon, Na. 1, has an area of 4 sares 16 guntine.
  - (b) Guilavankeri, No. 2, has an area of 11 acres and 38 ganthas.

No. 2 irrigotes 17 acres, ond No. 1 irrigates 38 acros or they irrigate 55 neres and 16 gnuthas.

The area, viz., 65 acres and 16 granthes can be irrigated in years of emple minfall. Besidee, after taking out paddy, sugarcaue may be caltivated in about 25 or 30 acres of land nearer the tanks. In the rest of the irrigable area, avri is sown.

When petty ropoirs, such as repairs to the sluice or dome are necessary, rayal's concorned contribute for it. The expenditure incarred is about Rs. 12 in n year or every alternate year. The tack in energy Na. 124. vis., Gullowshkeri was, it is said, ropaired by Government in 1892. The rayals are said to have contributed Rs. 100. The dam is in disrepair. There is no pakke built sluice. The tank is silted up, and about one-third of it andy retaine water; and the result is that, out of the whole area, acres 583—7 gunthas ander the tank only acres 56 and gunthas 16 is irrigated. The tanks are estimated to require about Re 1,500 to Rs. 2,000 for their repairs.

## (3) Halladkeri Tank at Karambal, Taluka Khanapur.

The tank area is 3 acres, 17 gunthos, and the assessment is nil. There is an record to show when the tank was constructed, nar is there any record as ta when it was repaired; but it appears from what the village officers state, that it was anse repaired before the head-quarter station was transferred from Bidi to Khanapar, which took place in 1864. This tank was ogain repaired by the Public Works Department in 1899 at a cost of Rs. 2,280 castenth of which, viz., Rs. 228 was centributed by the raynts of the village.

# (4) Maharki Tank of Kupatgiri.

The tank area is 1 acre and 18 gontas of lond, if repaired. Now tha tonk is almost filled with sand and oan hardly irrigote 10 ocres, if rains are good. The tank was repaired by the rayate some 20 years age at the cost of Rs. 500, and was deepened. But in three or four years it was covered with sand. It cauld, when repaired, hold water 3 or 4 oubits, 18 inches high. It cannot now hold half as much. About 40 acres of lond under the tonk is used for paddy sawing. But it gote no water-supply from the tank, and consequently the produce is canciderably less.

- If the tank is repaired, the same land may be fit to grow sugarcane. All this land is assessed highly owing to the proximity af the tank, which practically is of no ase now to the rayats."
- 57. Q. (Mr. Higham).—You soy that a great deal of land is thrown out of irrigation by the silting up of these tanks?—Yos.
- 58. Q. The land has been oesessed of wet rates, and cannot got irrigation?—Yes; the people would have grawn sngarcane, if they could have got the water; but now they only grow paddy.

- 59. Q. (The President.)—Because the tanks are not Mr. Artal. cleared out?—Yos.
- 60 Q. (Mr. Higham.)—Can you toll me roughly whot 9 Jan. 02. the cost, per 1,000 cubic fact, would bo?—I as not toll the cost af 1,000 cubic feet; but it will cost Rs. 1,000 to Re. 2,000 for the remayal of the silt from a small tank.
- 61. Q. How many thousand outic feet could you remove for that sum.—I cannot tell—perhaps a depth of two ta five feet.
- 62. Q. (Mr. Ibbetson.)—How mony norce would each a tonk irrigoto?—About 5 to 10 acres.
- 63. Q. (Mr. Higham.)—Can you tell ma the cost per 1,000 auhic feet of alearance, if the work were given out by contract?—I cannot.
- 64. Q. It ecems to me that it would cost more to clear ane thousand enbic feet of silt than the irrigation it would give would be worth?—Yes.
- 65. Q. Have you any asses in which tanks hove been cleared ant in this way ?—No.
- 66. Q. I presume that the only remedy would be to raise the banks?—That will be more economical.
- 67. Q. You say that the Muharkhi at Knpetgiri would irrigate about 60 neres?—Yes; but it is silted up so much that it can only irrigate 10 neres. The cultivators spout Rs. 500 on it, and now it is able to irrigate 40 acres.
- 63. Q. If they spent Rs. 1,000 on it, would it irrigata 80 acres ?—I do not know.
- 69. Q. In the Khanapar talaka the Public Works Department built o dam across the stream of a cost of Re. 2,280; and, I balieve, that is since silted up. It damoged another village?—It silted up on occumn of the eand, and the villagers have now objected to it, os it spoils their laad.
- (Mr. Muir-Mockenzi etated that 23 lakhe will probably be epent by Government in the Bolganm, Dhorwar, Kanara and Bijapar Districts on the systematic repoir of tanks, in order to save loss of revenue.)
- 70. Q. I want your opinion on this. Granting that so much money is put at your disposal, for the repaire of tanks, would it be worth deepening the tank to provide extra eterage?—It will be more economical to roise the bonks, but the general belief is that weter evaporates and runs dry sconer in tanks where the eilt is not removed than where it is removed and consequently the tank deepened.
- 71. Q. Does any land owner ever deepen his tonk ?—Yee, in a clamsy way.
- 72. Q. I moke out that it would east Rs. 5,000 far every extra acre brought under irrigation, I want to know what you think about it?—I cannot say anything definitely shout it, but it would be much better to raise the embankment.
- 73. Q. Is deepening over done?—Yes; one man'e tanke are sometimes deepened.
- 74. Q. Yon say black action coll in this district is not suitable for irrigation, what do they enlivate on that soil?—Same sowcars in Dharwar and Navalgand tred ta irrigate deep black cottan call; but they failed to grow garden crops. Peaplo grow wheat cotton and juari in ordinary black cotton soil.
- 75. Q. You have black cotton ecil, which is not very deep?—In the Dau Valley the black cotton soil is soid to be 20 feet deep.
- 76. Q. Is there any black cotton eoil, which cannot be lrrigated?—The block cetton eeil in the Parasgod taluka connet be irrigated.
- 77. Q. (Mr. Ibbetson.)—Are you speaking of the whole district or of your talnks only?—Only of my charge.
- 78. Q. (Mr. Higham.)—With regard to the tank huilt by the Sir Dosai of Shirshaugi, has that been campleted?—
  It is not finished. The stone work has to be dane.
- 79. Q. Has water been let into it?—The tank is fall of weter. But the water has not been used, and no canale have been made. It silts up, as it is situated in a very sandy place.
- 80. Q. Does it eilt fast P-I think it will eilt up in 25 years.
- 81. Q. Has he spent more than the Rs. 75,000 advanced by Government, besides the Rs. 75,000?—He has epent Re. 20,000 to 25,000 out of his own pockat.

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- Mr. Arial.

  82. Q. You do not think that he will make any profit out of it?—It will irrigats 1,000 acres, and, if he gots Rs. 10

  9 Jan. 02. The land under the tank is karal land.
  - \*83. Q. You say that there are a lot of places where the rayats make earthou dams across nallahs which cost Rs. 10 to 15 every year? Would it be worth Governments while te help thom to make bandharas?—Yoe, euch as are made iu the Nasik Dietrict.
  - 84. Q. Are any citos nvailable?—Yes, there are some small streams, snitable for bandharas.
  - -What about the rivers?-In Chikodi they have patasthal cultivation.
  - 86. Q.—How high above the bod do they bave the dame ? Five or six feet.
  - 87. Q. I enppose they run dry in the cold weather ?—They last to the end of February or March.
  - 88. Q. Hew many works of this kind are thore ?- Kot manr.
  - 89. Q. You say there are not many bandharas. Have you no idea how many there are?—I have eeen a few in Chikodi nad Sampgaon.
  - 90. Q. In your memorandum you refor to "other cources." You say 6,000 neres are irrigated by other sources?—Those other sources might be bandharas.
  - 91. Q. I suppose sugarcane is irrigated cometimee from these kacheha bandhs?—I have seen sugarcane watered by sups.
  - 92. Q. (Mr. Ribetson.)—You told us that where the survey system was introduced it protected the raynte against rey system was introduced it protected the hydrogams rack-ron'ting in Innu villagos, as the people were at the mercy of the Inamdar. Has the survey system been introduced into many villages?—The survey system has been introduced lately in the Chikodi talukee in six or seven out of 90 Inam villages.
  - 93. Q. It has not yet been introduced into half the number of villages? No.
  - 94. Q. It was done at the request of the Inamdars ?-Yes.
  - Mr. Muir Mackensie I think the total number of alienated villages was 59; and a survey hae lately been introduced icto most of thom
  - 95 Q. (Mr. Ibbetson.)—Has it been introduced into half?—I um not certain shout the number.
  - 96. Q. Have you may idea what the proportion is of the Inam villages in your charge in which the Servey Rules have not been introduced P—There is one village in the mpgaon talnka. I cannot give the figures for the other
  - 97. Q. You told no that the regards sowed engarcane in February, and trueted to early raine in April to water it. Yould the cultivators sow engarcane on the chance of rain coming at that time?—Sogarcane is sown in the rice areas on the chance of the water lasting. A hole is dug in the rice field, and the water is raised by sups.
  - 9S. Q. Broadly speaking what part of the district is most liable to famine?—The whole of Athni, some part of Gokak, Parasgad and ten or twelve villages on the northeast of Chikodl taluka.
  - 99. Q. Has there ever been n famine in the remainder of the district?—Not so fur as I know.
  - 100. Q. Was there a famine in 1896 and 1897 Pwes no famine in 1896, in Sampgaon there was a twelveanna crop.
    - 101. Q. There was a famino in 1876 ?-Yes.
    - 102. Q. And the scarcity in 1891?-Yee.
  - 103. Q. There was famino in 1899, and again last year so P-Yes
  - 104. Q. Where are the rico tanks principally eitnated?—The rice tanks are in the seeme parts, and not in the fumino parts.
  - 105. Q. Are there eny tanke in the inscence parte?-No.
  - 106. Q. And welle?-The whole number of the welle are in the secure parte.
  - 107. Q. You told ne that in many parts of the district, the extension of wells is not possible because you cannot get water. Where are those parts P—In the inecense tracts. get water. Where are those parts ?—In the inecenre tracts. They are in the southern pertion, where there is black cotton soil, and well irrigation is uet possible.

- 108. Q. Well irrigation is not possible on any very large scale in the southern portion of the insecure tract?—No.
- 109. Q. Is there any part of the northern pertion in which wells can be sunk?—About the nerthern parts I cannot say.
- 110. Q. You told us that it took from two to four menths to get a reply to an application for a takevi loau. You speak, I sapposo, of famino times.—How long does it take in ordinary times?—In ordinary times it takes from four to six months.
- 111. Q. What was the simplification of procedure adopted in the times of famines?—We kept an extra cetablishment, which made cummary enquiries.
- 112. Q. Do you think Government will lose much by the summary procedure adopted during the famine?—Yes, in Bijapur, I am afraid that in many instances Government will not be able to recover the advances.
- 113. Q. You do not think it would he safe to adopt a . summary enquiry in ordinary years?-No.
- 114. Q. With regard to the people keeping their own tanks in order, de you suppose that, if Government were to remit all the rovenue of euch tanks, as it does not intend to keep up, and banded them over to the raysts, would they keep them in repair?—No, they would not turn out to close them.
- 115. Q. And yet you tell us that, once upon u time, they used to turn out?—Yes, and they would do it now for old and respected village officers.
- 116. Q. Suppose we legislate to give civil officers power to call upon the people to turn out. Would that be u good thing?—Yes.
- 117. Q If you had that power, do you think it would be necessary to use it. Knowing you had the power, would it not induce the people to turn ont, without unduc presure?—Yes, in places where the cultivators are intelligent,
- 118. Q. I understand that rice is grown, without irriga-tion, except in a very dry year?—Yes.
  - 119. Q. Is that entirely in the eccure tract ?-Yes.
- 120. Q. You told ue about small earthen dams that the people throw across the nallahs, for which you think Government should give takavi. The earthen dams are washed away in the monsoon and so long as you have earthen dams they will be carried away year by year, and there will be no silting up; hut if you baild bandharas there will lo silting up?—When they build bandharas the people usually have one or two slaices.
- 121. Q. You said that the wells ran dry in Davi, that ie, the tract is which there was no sumine before?—Yes.
- 122. Q. Taking the cultivated area of the district what is the proportion of black soil which can be irrigated. Is it one-fourth?—Yos, about one-fourth.
- 123. Q. Is that in the conthern tract P-It is in the pure black soil country in the seuthern portion of the lusecure tract.
- 121. Q. Sappose a rayat berrows meany from the bania what interest does he pay?—He pays 12 per cent.
- 125. Q. Does he generally got that rate?-The rate varies and may be as much us from 18 per cent. to 24 per cent.
- 126. Q. Then is the 5 per cont., charged by Government, any obstacle?—I do not think so.
- 127. Q. Sapposo wo roduce it to 3 per cent. !- It would be a special encouragement,
- 12S. Q. Although wells cannot be mede in the inscence tracte?—Some small once can be made.
- 120. Q. Why cannot welle be made in the northern pertion of the dietrict?—There is no subsoil water. The people there sometimes have no water even to drink. They have to fetch water for drinking parposes from four or five milos.
- 130. Q. What is the ordinary period for the repayment of takavi loaas?-About ten years.
- 131. Q. Do you think that is enough?-Yee.
- 132. Q. Are there any compleints as to the shortness of time ?-No.
- 133. Q. So far eo I ean make ont, about 6,000 acree are irrigated by small earthen dams. Doss Government charge anything?—Nothing ee far as I know.
- 134. Q. What ie the patasthal ratof -The rate is lovied for eight or nine months and is included in the land revenue. I think it is about Rs. 2 an r.sre.

- 135. Q. Is it levied each year for all the lands netnally irrigated P-Yes, it does not vary from year ta year.
- (Mr. Muir-Mackenzie exploined that when a new bandhara is made it is inspected and the area which it can irrigate is marked down, it is the same in regard to a kachoha ar pakka bandhara end the assessment does not vary overy year.)
- 186. Q. You say that a man cannot build a kackeha bandhara without permissian P-In 1892 I enggested that a general permissian should be given.
- 137. Q. How long does it take to get permissian?—About 2 manths. I thought a good deal of tima was lost and so in the famine I issued a aircular letter giving permission to nee water from the streams without charge.
- 138. Q. Has a men ta make an application every year?—No, only ance.
- 189. Q. At present you have 6,000 acres irrigeted from these little etrane, suppose Government were to remit the patasthal rate and let the rayat use water without having te ask permission, would the area be largely increased, do you think?—Yes.
- 140, Q. Would it be doubled?—It might possibly be doubled.
- 141. Q. Is any af that irrigition in the insecure parts?
  -Na, it would all be in the secure part.
- 142. Q. In regard to small tunks are the bandhs generally in goad repair?—Na, they are being destrayed by neglect.
- 143. Q. Haw long has this been gaing an !-They have not been repeired in my generation.
- 144. Q. How much of the area irrigated has been reduced in consequence ?-Perhaps half the original area.
- · 14a. Q. Mastly rice tanks, I suppose P-Yes,
- 146. Q. Am there many private tanks?—These are called one-man tanks.
- 147. Q. De peaple still make these tanks?—No, net new.
- 148. Q. Why not, it is not, I suppose, because they are very exponsive F-No, they cost 1200.
- 149. Q. How many acres de they irrigate?—About 4 or 6 acres.
- 150. Q. Of cauo?—They would irrigate 1 or 2 acres of sugarcane.
- 151. Q. Have you had any applications for takavi for this kind of tanks?—Na.
- 152. Q. Why P-Because this area is not subject to famine.
- 153. Q. Take a rice field under a tank and a rice field dependent on rainfall, what is the difference in the crap?—The irrigated crop would be double that produced by the early rainfall.
- 154. Q. Is that because the rain fails or that a botter orap is produced P—I might give an instance. At Haldalheri the rayats got a double crop because they irrigated their rice fields from the tank.
- 155. Q. What da you mean by a kachoha well; one without any masonry at all?—Yes.
- 156. Q. Such a well might last 12 years f-Yes, about 12 years.
- 167. Q. If it is bullt up ou the mot side, how long will it last?—Thirty or forty years. They have such wells in the Chikedi Taluka.
- 158. Q. Are they showing signs of failing. Is there any reason why they should not go on for another 30 or 40 years?—I do not see why they should not.
- 159. Q. Wore many wells made during the famine ?— Yes, some new wells were made in the secure tracte and some were deepsned.
- 160. Q. Are many of the new wells still left kacheha? -- Yes, for want of funds.
- 161. Q. Suppose Government gave takavi, would they complete them ?—They have no scourity to offer.
- 102. Q. When a man builds a karkeks well and finds water, does not the land hecome more valuable as security?

  —Yes, but it may be already mortgaged.
- 163. Q. Dees not the Government claim take precedence?—The now rule is that Gavernment has no precedence over other mertgages.
- (Mr. Muir-Mackenzio explained that the rule referred to morigages in possession, and the question was

- under consideration in view of the heavy advences then Mr. Artal, being given.)
- 164. Q. (Mr. Rajaratna Mdlr.)—You just said that 9 Jan. 03. balf the area of the tanks has gone out af irrigotian. What is the probable less of revouse in consequence P—Ne less as the people pay the same revenue.
- 165. Q. Suppose the total area af a tank is 1,000 noies and it goes down to 500 acres, what would he the less of revenue?—Nanc so far as I know.
- 166 Q. Suppose the land is transferred to dry !—The water share would be about one fourth of the revenue. Tho loss would be ane-fourth.
- 167. Q. (Mr Muir-Mackenzie.)—The water share is 80 per cent. af the revenue under these tanks?—On the Maharki tank 40 acres have been reduced to 10, whereas the rayats are still paying full wet assessment though 30 acros have gone out of irrigation.
- 168. Q. What anthority have you for that statement P.—
  I was there yesterdny and I naticed that very little angureane was being grown, I enquired and got this information from the village officers and rayats.
- 169. Q. Was it last year only or is it a permanent reduction?—It is a permanent reduction.
- 170. Q. I think that will require very careful investigation?—The land was assessed for rice and not far sugar-
- 171. Q. (Mr. Rajaratna Mdlr.)—In the case of petty thinks, suppose a sub-Overseer is allowed for each talaka and a sufficient additional subtenent is placed with the Mamintdar, could not the repairs be arranged for?—We have a Sab-Overseer in Kanapur, but the difficulty is the rayats refuse to pay the 10 per cent. contribution.
- 173. Q. Supposing the 10 per cent. contribution was abolished?—Then the tanks would be repaired more quickly.
- 173. Q. Would you place any limit on the tauks yan propose to transfer to the Revenue Department?—I should say that tinks irrigating 5 acres and less should be transferred.
- 174. Q. Wauld yan go beyond that limit?—That question was considered by a Tank Cammittee in 1894, and they enme to the cenclusion that Revenue Officers would not be able to look after targer tanks.
- 175. Q. Would you not go se far as a 50-aere limit?-- Na, that is too large a tank-say 10 acros.
- 176. Q. You say that rice is grown in many parts with the aid of rainfall. Are such laids classed as wet?—Rice is grown by rainfall only in some meas which are alassed as Tari dry lands.
- 177. Q. In Kanapur there is a large area under rice cultivation, does it dapend on rainfall ?-Yes.
- 178. Q. It is stated that forest officers do not allow the rayats to take leaves for green manure?—Ries lands are not manured with gresn leaves. These rayats have a good supply of manure from their cattle.
- 179. Q. They have more cattle than the raysts in the red soil districts?—Yes.
- 180. Q. Do you know the Muchkundi tank?—I have seen it, but I know nothing about it.
- 181. Q. Do yan know the reason of its failure to irrigate the large area under it P—A suitable area is not under command of the tank. Some land at Bagalkot is irrigated by the tank.
- 182. Q. Yon stated that the Sir Desai of Shirangi was given a lean af its. 75,000. How was the menoy paid !— In instalments of Rs. 25,000.
- 183. Q. How long has the tank been under construction P-Since 1897.
- 183. Q Is the recovery to be made at once ?—No, about two years after.
- 185. Q. De you recover interest from date af paymont af instalments?—It is recovered in instalments, but it is calculated from a date to be fixed in this behalf by the authority who sauctions the leans, which is generally after not more than six months from the date of paymont of the lone.
  - 180. Q. Have ony instalments been recovered,?-Yes.
- 187. Q. What gnarantee have you that the whole of the money has been properly sport; has any special inspection been made?—He kept an account He is n respectible man and I accepted his statement. When I asked for an inspection of his account he handed it to me it once, and

Mr. Artal. I found that he had actually spent Re. 92,000 on the tank.

He omployed an Overseer on Rs. 30 per moath.

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- 188. Q. In paragraph 22 of yonr printed memoraodam you say:—"that in years of droaght the collector should issue general orders permitting the free use of such water"; what do you meau? Is it always necessary to go to the Collector or Assistant Collector for permission?—The village officer doce not allow the use of water from etreams without the permission of the Collector.
- 189. Q. Has the Mamlatdar or the Sch-Divisional Officer no power to sauction it?—No.
- Umeer no power to sanction it?—No.

  190. Q. In paragraph 4 you cay:—"The Land Reveous Code adequately protects against any inture onhancement of revenue having regard to improvements effected in any land daring the currency of my previous settlements at the cost of the occupant or the holder." Are not the rayats protected against officement in inture revisions of the settlement?—They are protected against inture enhancement if they halld their own wells.

  191. O. (Mo. Dibeton)—Do the people know this?
- 191. Q. (Mr. Ibbetson.)—Do the people knew this?— Most people do. Only the ignorant Kundismoy not know
- 192. Q. (Mr. Muir-Mackenzie).—Gao yos explain the general ignorance of Teshildare and Mamlatdars regarding exemption on improvemente?—No, except that perhaps they do not study the Land Revenue Code.
- 193. Q. Yon are familiar with tals. You directed my ottention to thom in 1896-97 in the Taluk of Indi P—At Horti, I remember telling you ahout them.
- 194. Q. I want to know whether you consider these handhe are advantageous in famine years in affording the myst to grow some erop?—If there is no minfall they are
- 195. Q. But does not the soil behind these bandles retain moisture? Yes, that small area will be protected in a famios year.

- 196. Q. Do you consider that owing to the great advantage of these talls their numbers have increased P-Yes, about 10 per cent.
- 197. Q. How do they build them f—They borrow takavi. They spend some of the money for their own nso, and a whole family, men, women and children work on the tal.
- 198. Q. Do they make them of earth or stone?-Uoually
- 199. Q. I have seen stone once?—Yes, I know of a case in which a man has spent Rs. 1,000 and made a tal of otone with sinice gates. It is like n reservoir.
- 200. Q. The greater number aro not like reservoirs, they are intended only for a elight accommodation of water ?-
- 201. Q. Ic not the ecope for constructing those tals limited by the small eize of the boldings in many enses F—Yes, if a man wants to held a tal he would have to go through another man's bed in some places.
- 202. Q. The water spread must be in his own holding?-
- 203. Q. Why do people not huild more tals, is it want of money f-Yes.
- 204. Q. Then it would he a good object for Government to give liberel takavi for ?—Yee.
- 205. Q. In 1896-97 what was the extect of advances for this purpose as compared with wells?—For wells one-fourth; for tals, otc., thros-fourth; half of this was for nrms and the remoining half for deopening, etc.
- 206. Q. (Mr. Ibbetson).—Did I understand you to easy that where oultivators took tokavi for tals they employed their own lohour, and that for purposes of haiding tals in ordinary years takavi is not necessary. Then it is really necessary as famine relief f—Yes.

## WITNESS No. 76 .- MR. P. J. FITZOIBBON, A.M.I.C.E., Executivo Englineer, Belganm.

Mr: P J. 1. Q. (The President),-You are Executive Engineer Fitzgibbon. of this District !-Yes.

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- 2. Q. How long have you been here?-For four years.
- 3. Q. I understond that you were here during the famine !—I was here during the famine of 1896.97; I was not here daring the recent famine.
- 4. Q. In what other districts have you served?—In cost of the Deccan Districts, in Gujarat and in the Konkan.
- 5. Q. Other witnesses here informed us that Athni, Gokak and the Parasgad talokas have saffered most from famine, especially Athnif—Proctically they were the only talokas which suffered.
- 6. Q. Athni was especially had? Yes, in Athni the people suffered very severely.
- people suttored very soverely.

  7. Q. Can you toll us what menns, you think, should he adopted to enable these talnkas to resist future famines. I would like you to take the talnkas one hy one. Take Athai first; hare you may promising tank schemes in vlow in that talnka?—In Athai I have a tonk schemos a viow. It is n rery promising coleme, and I am having it enveyed. It is near Kokatnor, and is at the junction of the two unllahs, its catelment area is 155 square miles, it will command a fair tract of land and will be as big as the Visupur taak at Ahmednovar. Ahmednogar.
- 8. Q. Is it a good site?—The tank hos just been surveyed. I have not yet had the onnel surveyed, but I have no doubt that it will command as much land as there will
- 9. Q. Is it one of the tanks mentioned in Mr. Beale's report on Irrigation works in the Bombay Presidency?—Yes, it is referred to on page 319 of the report.
- 10. Q. Has it been thoroughly examined yet?-I am having it survoyed now.
- 11. Q. And what do you propose to do for the rest of Athni?—I do not think there is mything else to recom-
- 12. Q. Can you tell ne something about the Tacsi tonk. I believe 2 lakes of rupees have been spent on it. Is it a hopeless project?—Yes, quite hopeless, it was not thoroughly examined hefore it was etarted.
- 13. Q. That was a fatal flaw?—Yes, there was no observe of fundations. We could not found the puddle

- trenches at 35 feet depth. We got to eand pockets and the filling in elipped away as it would in quicksand.
- 14. Q. How deep down did you get?-About 30 or 35
- 15. Q. Were any triol horings taken to try and find rock ?—No, we dog down to 35 feet and went no further.
- 16. Q. Concidering the great wants of the District supposing you were likely to find rock at 40 feet, was it worth while going down?—No.

  17. Q. (Mr. Higham).—Would you hulld a high dam there?—No, it is karal soil which is not suitable for a high dam.
- high dam.
- 18. Q. (The President.)—What about a masonry dam?
  —You would not get foundations, and if you get them at
  40 feet, the dam would be very expensive.
- 19. Q. The only reason I mention it is that apparently as regarde sitantica it is a very desirable project — Yee, so much so that I surveyed the canal for 90 miles to the boundary of the district where it joiced the Krishna.
- 20. Q. What was the otorage to be ?- I cannot quite remember, but it was a lorgo tank with a dam fof a mile
- 21. Q. Are you quite sure it is not worth going on with?—Yes, on that particular site there can be nothing hut foilure.
- 22. Q. Are there noy other possible eites?—At Sirnr-higher up where there was a site, the suil was worse still.
- 23. Q. I suppose you do not know of anything else that can be done for Athni taluku ?—I know of nothing else in can be done for Atini taluan r—1 know of nothing else in that part of tha district in the way of lorge irrigation works. We might do a good deal in the way of constructing puddle treaches across the larger milhals to hold up the sub-soil water. In 1896-97 there was a good supply of sub-soil water in the district, but last year there was cothing. The wells had to be deepened and the people were reached to make the contract had to a few water. very bodly off for water.
- 21. Q. (Mr. Higham.)—Where do you propose to put these puddle tronches?—At Visapur where the people were very hadly off for water during the first fumino year, I made a puddle trench across the nallah hed and in the second year of fumine the people had a oplendid supply of sub-soil water upstream of the trecohes. I then pat down Norton tobes in the river bed nod the wells in the nestream side got an increased oupply.

- 25. Q. What about thei Gokak Taluka ?—I think that the extension of the Gokak canal should be sanctioned.
- 26. Q Will you please tell as all about the Gokak canal, two of any members were not there yesterday when you took as ever the warks. What is the storage?—In the Gakak reserveir as at present constructed 900 million cubic feet is stored.
- 27. Q. You propose to have two subsidiary reservoirs in addition to raising the weir 7 feet. What would your storage be?—The raising by 7 feet would double the present eterage to 1,800 million cubic feet.
- 28. Q. Your two new subsidiary reservoirs would come above?—Yee, there will be two reservoirs and there would be a dam to each.
- 29. Q. What would they store?—The storage will be as follows:—At Hadalgi 3,000 millian oubic feet; at Aralgundi 4,300 million oubic feet and at Beniwad 3,122 (the latter is an alternative scheme is Aralgundi), altogether about 10,000 millian oubic feet.
- So. Q. This 10,100 millions of oubin fact besides the present reservoir supply of 800 million or after the present dam is raised, say nitogether semething short af 12,000 enbin feet?—Yes.
- 31. Q. What will be the full demands from the mills? —The mills require 136 enbie feet per second, and this for seven manths amonuts to 2,500 million cubic feet of the storage,
- 32. Q. That will leave 8,500 million enbio foot, nearly the whole of which can be elsimed for additional irrigation?
  —Yes, except what is lest by evaporation and percolation.
- 33. Q. On the other 'band, I suppose there is a good deal of water entering the reservoir up to a considerably into date after the monsoon?—Yes, we get the benefit of the streams. About 93 oubic feet of water per second is now running into the 12hupdal or Gokak reservoir, but we get nothing after March.
- 31. Q. That is n large ingredient to consider in connection with the storage of your reservoir?—Yes.
- 35. Q. I suppose in an ordinary monsoon season you would expect the reservoir to fill by the ond of the monsoon F—Yes, we have never drawn on the reservoir oven in the worst years before the heginning of Docember.
- 36. Q. How far down does your irrigation go?—The main canal is 25 miles, nad there are 12 miles of branch candl.
- 37. Q. What is the maximum area irrigated by the Gakak canal?—The irrigation on the Gakak bus been a little over 10,000 acres out of a commanded area of 17,000—more than 60 per cent.
- SS. Q. A very high percentage indeed?—The I brauch canal from which we irrigate runs along a ridge and we am irrigate the land on both sides.
- 39. Q. Was the proposed second section over begun at nll?—Yes, several lakes were expended on earthwork during the famine of 1876-77. It is proposed that Sentian II should be 58 miles long with a branch sention of 40 miles in the Mindhel State, a branch in the Jumklandi State of 40 miles and an extension of 40 miles beyond Mudhal to command the area in British territory in the Bijapur District.
- 40. Q. What is the sail all through that tract?—There is a good deal of poor soil. But near the rivers Ghatprabia and Krishna, the soil is black, while it is red on the ridges.
- 41. Q. Is it deep black cotton soil such as would decline irrigation?—In a year of good rainfall that black soil might refuse water.
- 42. Q. You have no fear yourself of the water not being taken for irrigation?—I think that they would take it largely in the kharif season for all lightlands, and in a had year for black soil as well.
- 43. Q. Doos your scheme embrace a tail reservoir that the waste water might be tarned into P—We have a scheme, but the conditions are uninventable, it would submerge lands worth two lakks of rupees.
- 41. Q. Da you know whether there are any siles in Hijapur?—I think they have been examined very largely. The difficulty is that banks of the rivers are very high and the channels very low.
- 45. Q. You think the whole country can be commanded with reservoirs and the storage tanks proposed in the ghats in cannection with the Gokuk extension project?—Yes, practically.

- 46. Q. Why can't yen go beyond Bagalkot with the canal?—With the praposed reservairs there will not be enough water for the whole of the land. Thecanal bosides cannat ga beyond the Ghatprabha in Bajapur where it joins the Krishna near Begalkot.
- 47. Q. (The President.)—Wa hope that it be people will show a better appreciation for the water at Bagalkot than the people de an the Muchkundi. Is that not due to the fact that the tank does not always fill?—Yoe, the people object to an uncortain supply.
- 48. Q. The rough estimate, I noderstand, for the Gokak extension is 91 laklis of rupees?—Yes, for the whole project
- 49. Q. How many years will it take to complete, supposing you had the money as fast as you can spend it to advantage?—I think it would take 15 years.
- 50. Q. You base that an the labour available?-Yes.
- 51. Q. But will not big works attract labourers from other districts?—Yes, but even then it will take 15 years to complete.
- 52. Q. Are the sites of the proposed storage tanks near the Dhapdal tank which we saw yesterday ?—Yes, Beniwad is within 10 miles, the second within 20 and the third within 30 miles fram the Gokak weir.
- 53. Q. All three are in the Belganm 'district?—They are within the limits of the district, but the Hudalgi submerges land entirely in the Kolabpur State and the Aralgundi partly.
- 54. Q. Would that be an insuperable difficulty !- No. I think it is only a questian of componentian.
- 55. Q. Now to go further south, what about the Parasgad talukn?—Before leaving the Gokak district I should
  lika to mention the project to nonke a tank on the Markandya. I should like to see a reservoir constructed in the
  Markandya river. It runs through a gorge which could be
  clauded by a masonry weir and would command a considerable area of land. It jains the Ghatprabha just below the
  falls.
- 56. Q. Is there any means of utilizing the waste water of the mille?—The waste water from the mille at Gokak caunet be utilized; the river is a sluggish and lies too low. There is a scheme in connection with the Chikuandi natitat. This scheme was mooted 25 years age. A bridge has since been built close to the sita and there would be some expense in consequence, as the bridge would have to be shifted and the read re-aligned. I am also deabtful about the foundations. The Markandya project would command part of the same area.
- 57. Q. The Markandya would take up irrigntion on the right and the Golak extension on the left bank?—Yes.
- 58. Q. How far cost does that Taluka go?—There are Native Stale villages which it touches.
- 50. Q. Have you had any consultation with the Excentive Engineer, Bijapur, about these projects?—No, the Executive Engineer, Bijapur, has not yot been consulted as to the Gekak extension project.
- 60. Q. In what time could you have the project ready for submission to Government?—I canuot promise it in any time, I have no leisnre.
- Ol. Q. If the Government gave you an Assistant Engineer and a survey establishment how long would it take?—With an Assistant Engiacer and a survey party a good deal could be done in six months. Of course ne surveys would be possible in the rains.
- 62. Q. A year hence, would the project be ready ?—Yes, a capuble Assistant Engineer could work it out in detail in a year.
- 63. Q. I suppose you look upon this as the most promising scheme in the district?—Yes, the only other large scheme is the Malprabha project. The river passes through a garge, and the idea is to huilt a high masonry dam, but this would submerge a tremendous area at laud. It is near Manoli (Navatirth).
- 64. Q. Yon have reported favourably on it, I understand?—Yes, on the site which is excallent; there is a garge 300 feet deep and very narrow, but the water cannot be led anywhere where it would be used.
- 65. Q. Do you know if anything can be done for Paraspad?—Paraspad is particularly hapeless. There is deep black cottan seil there. I have known it as deep as 100 fost. I built a wall recently near Parasgad 100 feet deep in a villaga in which there was no water, and there is not a drop in it at the present memont. It is situated in the south-eastern part of the taluka.

Mr. P. J. Fitzgibbon.

Mr P.J. Fitzgibbon, No.

- 66. Q. I suppose it is not a snitable place for wells?-
- 67. Q. If the Gokak extension were taken up do you think it would absorb the resources of this district, as regards labour f—Yes.
  - 68. Q. If it took 15 years to carry out it might prove a good form of famine relief work?—Yes, as far as the canalitself is concerned, but I do not see how famino labour could be comployed on the tanks. The northern part of Paragad is very rocky, the soil is red and there is no trap. You can go 60 feet deep through rock without getting water.
  - 69. Q. (Mr. Mair-Mackenzie.)—It is red rock of a par-ticularly hard kind, but nat trap. What do the people do to got driaking water?—They go 6 or 7 miles for it.
  - 70. Q. (Mr. Higham.)—What Is the amount of estimato for the Gokak extension scheme?—lias it heen regularly estimated or are the estimates only approximate? - The can'l may originally estimated for in 1808
  - 71. Q. And the tanks?—The tanks were estimated for at various stages in 1881 and 1896.
  - 72. Q. The amounts given in Mr. Beale's report on page 333 may be taken as fairly accurate?—Yes, they were arrived at in 1886.
  - 73. Q. Havo they been revised in may way since?-
  - 74. Q. Is there not a tendency naw to raise the refer then fixed ? No, the rates, if anything, have been reduced for masonry.
  - 75. Q. Before the project could be sanctioned, the details would have to be norked out?—Yes, the figures would have to be recast. The and compensation, which is much hervier now, would affect the question much more than the question of mice.
  - 70. Q. Have trial horings been made?-Trial pils were taken down to rock.
  - 77. Q. On the regular tengitediant section of the dain's
  - 78 Q. Merely a general estimate, I suppose, has been made for the work?—Yes, lump sums have been estimated for each outlet.
  - 73. Q. What about the wolfa ?—They are subsidiary neirs to act as water cushions. Except the Aralgunds, the dam of which is proposed to be of earth, the tanks at Bankand and Hadaigi are to be mannery, and the saver will flow over the top like the Golak were.
  - 80. Q I suppose no diamings have been norked out?-
  - and, not in any decime.

    81. Q. Supposing it was decided to carry out this 91 lists project which would take 16 years to complete, 1 suppose the dam could be carried out and brought into me gradually. For instance, you have a lot of Marrie trigger tion on the Gokak, could you extend that strigation at once by constructing this section No. 2 of the Gokak canal?—Yea, the work could be done in sections and we could increase trigation at once.

    82. A mediated that were an increase the first of
  - 82. Q. I understand that you can increase the kineif irrigation without any storage tracks so that as you much each weir you can extend largestion. So that you can ready start irrigating additional areas in the next two or three jears !- Yes.
  - So. Q. I cannot find that any allowance less Leen made for the lass of water.
  - (To Mr. Beale.)—I think there must be same mistake in the figures on page 331 of the Report on Bomb or brightion.
  - Mr. Bode explained that allorance had been made for less of rater in the 200 miles by taking 12 arresport million for the first achiene instead of 18, and less for the second and third schemes
  - St. Q. Is the loss on the present canal considerable i-Yes, it runs through muram.
  - 85. Q. The near can'll would irrigated the same kind of soil me the present canal?—No, not all through, some is black cotton soil.
  - 86. Q. You say the compensation will probably be much more than formerly f-Yes, as two of the tanks will have to he lu Kollespor territory.
  - 87. Q. The Aralgundi will be partly in Kolhapur F-l am rather to favour of the l'enimed and Itadalgi reheves. Hadalgi is entirely in the Kolhapur State.
  - 88. Q. Have you taken up land before for tank- in a Katire State?—Yes, the Bhatgarh tank is to the Native State of Bhor.

- 80. Q. Has the Kolhapor Sinte been approached on the subject !- There was some correspondence, but nothing defi-
- 60, Q. Why should not the composition take the form of an annual charge on the land taken up instead of purchasing it outright?—In an aimid I um not competed to ansuer the question. I do not know if the land could be rented from the Kolhapur State. I dare say it coold be done.
- 91. Q. Would it involve a transfer from the Secretary of State?—I know that the land through which the Porlyar rous in Travaurore is only routed from the Mysero State.
- 92. Q. I thought that was the case also at Bhatgarh.
- Mr. Bealo explained that the land at Bhatgarli has been
- 03. Q. Apart from the Gokak can'd the most promising schone is, I believe, that proposed at Kokatnur P-Yes, Kekatnur sceme a promising scheme.
- 81. Q. Do you think it should be carried out ?it might be extrict out as a protective work. It would not do as a productive work, as much of the command as black soil out a good doal of the water would not be used in good years.
- 05. Q. What would it cost ?-The cost would be about 0 or 7 lables. The height of the dam would be 40 feet.
- 116. Q. The work mughl he planned out and kept ready as a famino work?—Yes; It would be a very useful fanding
- 17. Q. Are there any other tank projects which soight be treated in the same way?—If the Durdandi is to be carried out, the earth dam could be made by tamino labour,
- 99. Q. Conkl not flamine labour be employed on all of them with advantage?-Nu; the Markandya would be a mesonry dam.
- on, Q. That might wait till you finish the Gokak extension. It must stond on its merits !- Yes; I think so.
- 100. Q. It has been reported that you have repaired 35 of the small tanks to this district i-les; the number must be 50 now.
- 101. Q. And wane 400 remain in he done, what are the 101. 13. And there of the reflected re-We have some 410 of our lands. There small tanks are without waste weirs and have no outless, there is seldem any pitching, and in some cases the data have been breached.
- 102. Q. What is the average height? Maximum about 30 feet, aremise about 29 feet.
- 103. Q. They bit up a good deal, I sappose. Hare you attempted to clear them f-No; I have raised the dain 2 feet and find that is the chespest way. That sometimes me as submarging good land leyond.
- 101 Q. Are any objections made against raising the dame, and submerging lands?—In some cases we have to pay land compensation. The people in this district are very land-hungiy.
- 105 Q. I should have thought that in small tanks like there, compensation would not be necessary fully some cases the people are not compensated. They can then cultivate only in the call senson and to lose the more valuable. " (110) (10).
- 106 Q. Do you buy the land out?—My plan is to pur-clase the land and then resell it.
- 107. Q Would it not suffice to pay compensation for the last of a crop and leave them the land to make what they can from it?—No; we generally have to purchase the land.
- 16%. Q. Whot advantage does that have over paying computation for loss?—We probably get a better largein.
- 100. Q. The alternative would be to acquire the land?— They make untrescondle demands when I offer compen-sation for loss, but when I want to purchase they come to
- 110. Q. When you raise the dams you have to purchase the land?—Not always. The rayats sometimes come forward and say "raise the dam and we will pay the land compensation." We, however, cannot accept more than 10 per cent of the cost of repairs. We might leave them to wettle the compensation with the owners of the land that it little to a subpressed. is likely to be submerged.
- 111. Q. The repairs consist of raising the banks, making waste were and repairing the outlets, where necessary?—Yes, sometimes also the water level has been low fee a very long time the Revenue trepartment lets out the land under the tank to a cultivator, and then, when, I raise the dam, I have to acquire the land.

.112. Q. The moral is to let them make their own arrangements P-Yes, but if we do not restore the tank we have got to give up the nesessment.

113. Q. Have you given up the assessment in many cases in this district P—No, not to my knowledge.

- . 114. Q. Suppose the water level falle, you do not give up the assessment, but let the land to mether cultivator. F. Yes, but this could only be done at dry orop rates.
- 115. Q. Do you let the land?-No; the right of oconpancy is sold.
- 116. Q. What shout the Gadikeri Tank?-It is a large second claes work.
- 117. Q. Has anything been proposed in connection with improving it? —It cannot be improved, it irrigates all the land it is possible to irrigate.
- 118. Q. What about the silting up of the small tanks?-
- 119. Q. What is the ordinary life of one of those touke?—Most of these tanks must be 100 years old.
- 120. Q. I suppose they have got u lot of silt in thom?-
- 121. Q. (Mr. Ibbetson.)—You say that in 1896-97, there was a good supply of sub-seil water in Athni and good food crops were obtained under wells, but that the water went down considerably by 1900, due to a succession of dry reads?—Yes. Jears ?-Yes.
- 122. Q. Is there much well irrigation in Athni?—There is a fair amount, but it is diminishing a great deal.
- 123. Q. In ordinary years those is a considerable amenat? -Yes; the people thoroughly understand wells.
- 124. Q. Do you think that the aren under wells could be increased?—Not under present conditions.
- 125. Q. Supposing the out-soil water rises again?-If the sub-soil water rises again, there would, I think, be a . large increase, owing to the amount recently spent on
- 126. Q. Is there any considerable portion of the talukn where wells cannot be made?—There are, I chould say, no parte unfit for wells, except near the Krishua, where they are not required.
- 127. Q. What is the ordinary depth of water P-In 1896-97 it was 30 feet.
- 128. Q. Is all the soil fit for irrigation or is there a good deal of deep black ootton soil?—There is some deep black soil on the Krishnu, but in other parts irrigation from wells would be profitable on block soil.
- 129. Q. What are the chiof crops irrigated ander wells?

  Junti, maize and fedder for eatile also wheat and sweet potatoos.
- 130. Q. Is that in ordinary years ?- I am speaking of famino yenra.
- 191. Q. What do they grow in ordinary years ?-Garden crops, sugar-cane, etc.
- 132. Q. If the area of wells were extended, would manure and capital be available?—There is not sufficient manare in the country. It would be a good thing to import fish manare. I have spoken to the people, who say that they
- 133. Q. Are the people of this district fairly well off P-Under the Gokak count the people are well to do new-ndays.
- 134. Q. I mean apart from the canal tract?-Athni is nlinost depopulated, 40 per cents of the people have omi-
- 135. Q. (Mr. Muir-Mackenzie.)—Was there a large decrease in the 1901 census from 1891?—Yes, a considerablo doarense
- 186. Q. (Mr. Ibbetson.)—The place is quite reined?—My present experience in Athai is that there is great difficulty in obtaining male labour, only the women ure left, but with a couple of good seasons the taluka would recover very largely. The Krishna fleede considerable areas.
- 137. Q. You have, I dare sey, bad a good deal of experience in sinking wells !—I have sunk 30 or 40 wells in this district.
- 198. Q. On account of the Public Works Department P-No. generally on account of Local Boards, I am new constructing some for the Local Board.
- 139. Q. What do these wells bost?—Some have cost lte. 4,000, same can be made for R500.
- 140. Q. Under what circumstances would wells costing R500 or R600 be possible?—Where you can get water, without having to excavute largely in rock, ut a depth of

- 141. Q. Are those conditions at all common in the district?—Not at present; they were before in Belgaum.
- 142. Q. And in the lascoure part?—In Parasgad the water is ecidom.less than 80 feet down. I have had to go down as much as 110 feet. In Athni it is much nearer.
- 143. Q. In Athni, could u pakka woll be built for R500 or R6:09—A pakka well there would cost R1,000 with masonry on the mot side.
  - 144 Q. Have you any experience of dry masonry wells?
    -Yes; I built one in my own compound here.
- 145. Q. Do you know how it would last us compared with lime masenry?—A dry masoury well abould last as long as a well built with line masoury, but the thickness is about double, viz., 2'—6" against 1'—3" except with laterite which is easily dressed.
- 146 Q. Which would be the cheapor in the ond?-Lime masoury, except in laterite, where you can have a thin steining.
- 147. Q. One well would last as long as the other; that is almost indefinitely?—The fault is that the people build them round instead of equare. Round wells are better.
- 148. Q. Round wells built with masonry would lust for over ?—Yes, practically for over in hard trap; in laterite I would not give any guarantee.
- 149. Q. Woald it be safe to assume 50 years us the life of a well built well?—Fifty years would be a very safe figure, it would last for more than that; even 100 years would be a safe figure.
- 150. Q. At any rate 50 years would be quite safe?-Yes.
- 151. Q. By a well built well, I mean such u well as a rayat would build?—As a rule the rayat uses very bad stone and werse mortar.
- steac and werse moriar.

  152. Q. Take the ordinary rayet who will not use very well dressed stone and uet first class mertar, would it be too long to assume that such u well would last 50 years P—If built circular and twice as their as I chould make it, it would be safe to assume 50 years us the life of such a well, if founded on rock and not on muram.
- 163. Q. Wolls are generally built on rock in the Decom P-Yes; but in other cases I have reached no foundation after going 100 feet deep. I have built a well in Parasgad on curbs. At Yedravi, there is a well 100 feet deep, founded on a curb, without any water. I have brought water down into a cistern in this yillage from a cave upon the hill above it.
- 154. Q. What do the curbs rest on ?—Some rest on an alluvial deposit; here in Bolgaum it is a kind of other olay, and in Parosgad black soil. We have a great variety of soil in the district.
- 165. Q. I suppose the life of these wells is very procarioas ?-Yes.
- 156. Q. Is all the available water on the Gokak canal used overy year; is the demand is excess of the supply ?-
- 157. Q. Even in a year of good minfall ?—Yes; even in years of good minfall. But somotimes we might got eciao water we cannot count on by thunderstorms.
- 158. Q. It would not be for want of demand that you would not use all the water available ?—No; the demand is in excess of the supply.
- 159. Q. What is the proportion of cane irrigated ?—The proportion of cane to other crops is small, because in the hot weather I have only 6 onbie feet per second of water to
- 160. Q. You can give an eight-menths supply, I suppose P.—To a limited extent only. I have to husband my eapply so as not to draw appen my reserve for the mills. The proportions of irrigation to the various crops are as

Perennial 2 per cont. Kbarif 16 per cont. | Rabi 49 per cont. Kbarif 25 per cont. | Mensoon 83 per cont.

- 161. Q. What crops do the people irrigate in the men soons?—They grow juari, bajri, kulli, ragi, tur and chilliee.
- 102. Q. A good deal entered under menseeu erops is really garden erops?—The principal four-month erops are onious, garlic, etc.; they grow them even in the rabi conson though they are four-month crops. In the measure we charge them rabi rates as well as in the rabi conson.
- 163. Q. On your caush how much of the rabi onlivation is ordinary feed crops and how much high class crops ?— Is orthany accuracy and now much might chose orops re-Fifteen per cent. is gardon creps and the other 85 per cent. cerculs—millets und pulse. This has been the proportion in mererecent years, but in other years the propertion of

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Mr. P. J. garden crops to dry crops is 30 per cent., ugainst 70 per cent. Fitzgibbon. The uverage for 10 years is 25 to 75.

164. Q. Yon say that you refuse applications for garden craps. Are these applications submitted every year?—I refusa paronnial crop applications, but up to the present I have not refused garden orope.

have not refused garden orope.

165. Q. Suppose that a man has a field of junri and he puts off upplying for water on the score of sxpanse till the vory last moment, if the permit does not come until after 10 or 14 days, he may lose his crops altegather. What does he do then?—The enlitivator takes the water und sends in his application afterwards. I have fixed dates beyond which no man may take water without heliog charged danble rates.

166. Q. In that case they take the water without leave. Then, what is the object of the application?—I cannot prevant them taking the wuter.

167. Q. It is not by your permission that thay take it without wuiting?—They take it before they get permission.

168. Q. Thut is, in offect, that they help themselves to water, whonever they want it?—Yes.

169. Q. What is the use then af having the application eystem ut ull?—The application is a check on the establishment and prayents surreptitious watering escaping attention.

170. Q. They would have to pay any how?-We would not know when they took the water.

171. Q. If a man were going to take water illegally, do you think he is going to tall you 4—No, but if he is found out he has get to pay double rates.

172. Q. We have been told that the reason for the application is that you knew the demand you have to meet and how much you can guarantes. You want to know how much you can pledge yourself to supply?—It would come to this if we did away with the applications: the people might exceed the limit of the water-supply.

173. Q. I suppose yan have some system of ratation; could not restriction be upplied by outting off the supply for longer periods?—I could not regulate the unmaunt of for longer pariods ?water ta ba sent down for may accison.

174. Q. Yon mean you might send dawn more water than is wanted?—Late rains come in October, whon the mbi crop is sturting, and we would be very much in the dark as to what the cultivators were doing.

175., Q. Ydu enn tell whothar a field has been irrigated and how much water has been used ?-No, you might get a shower in between.

176. Q. Do you know that the whole of the area in Upper India is so irrugated ?—My experience is that you cannot tell after a week, especially if rain has fallen in the interval.

177. Q. You trust to the peaple applying is order to render thomselves liable; that does not seem to be a sound system?—The rayats always are trying to get the better of you.

178. Q. You do not think that the system of application could be abolished !—If you dld, the revenues of the canal would suffer.

179 Q. Do the people take water without permission and pny donble rates ?—Yes, thay take a good deal, they do not mind the double rates.

180. Q. What is the praportion of the area on which tha peaple pay double rates?—About 5 per cent.

181. Q. 1 understood that vilingo tanks are at present divided into second class irrigation works, which are maindivided into second class irrigation works, when are infinitional by the Public Works Department, and other tanks which are managed by the Revenue authorities?—No. There are three talukus in which there are such tanks. There are 410 tanks, excluding the inaudars and 'ana-man' tanks. All these tanks pro entered in tha list under the scheme far repairs. They are all liable to ha repaired by this Dopartment.

182 Q. I am speaking of the prescribed classification ?-There is no limit as regards siza.

183. Q. Do the present orders as regards repairs of tanks include all tanks?—Yes, all tanks, with the two ex eptlens named, have to be unintained.

184. Q All have been brought under the echema for repairs?—Yes.

186. Q. (Mr. Higham.)—Even those under fifty acres P— Yes; what I do, whou I get an application from a number of rayats for repairs to their tank, is to see if the cost of repairs is less than tenyears' revenue. In that casa I apply to tha Collector, and, if he approves, and I find that there is a bulance in the allatment for repairs. I pat the work in Collector, and, if he approves, and I find that there is a bulance in the allatment for repairs, I pat the work in haud after the estimate has been sanctioned. When it is repaired, I hand it hack to the rayats to mulutain. I keep an eya on tha tank, and toll them that they must keep it in repair. And if they do not do so, I repart the case to tha Collector, who, hawever, tells me that he has no legal power ta force them to repair their tank. Sometimes I egain repair the tank, und usk the Callector to recover the cost.

186. Q. Has it been colleated ?-Yee, it has been in some

187. Q. (Mr. Ibbetson.)—Do you think that Government should legislate to give the Collector power to get these small repairs carried out?—I do think so.

188. Q. (Mr. Rajaratna Mdlr.).—You say that the rayats are allowed to take water without previous uppliestion ?-Yss.

189. Q. Is that confined to any partianler work, or is it a general rule ?—I have only one canal nuder maund my statement is confined to that.

190. Q. The messnrement of the irrigated urea is donoby a measuring staff. Is there may check on them?—Yes; the Snb-Divisional Officer une to check 10 per cent., and I sheck some myself.

101. Q. Is there any roam for frand?—Yes; I have found that lerga ureas have not been measured stall. In ano case, two years ago, we found that a measurer had taken 3500, and let off land on which the water-rate would have been R1.100.

192. Q. Ho takes his 10 per cont. ?-Yes, and very often

193. Q. Whet is the runge of a Divisional Officer?--About 12 miles.

191. Q. What is the range of each measurer?-We have two measurers, and does 6,000 ueres and the other man 4,000 acres, but he has ather duties in addition.

105. Q Could not an urrangement be made with the rayats to sattle the nrea of permanent irrigation?—I had stones fixed for the sub-divisional numbers so us to obviate measarement, but I found that the people moved the stones.

106. Q. Is there no Baundary Aat?—Yes, but that does not dotar them. It does not apply to stones fixed by the Public Warks Department.

107. Q. Canld not the Survey Department demarcate the houndary, and they would than he limble to proceedint P-Yes, but that will require same consideration. As the stones were being constantly moved, I stopped the system of sub-divisions.

198. Q. In regard to petty tanks, da you take them in hand and repair them as required, or do you wait for the rayats to apply?—I prefer to do the tanks for which the rayats' upplications are submitted.

199. Q. (Mr. Muir. Mackenzie).—Yau have not found the 10 per cent. contribution system on obstacle to your spending your full ullotment for repairs?—No, the royats have in every case contributed the 10 per cent. The allatments are not large. They only average R15,000 u year.

200. Q. (The President).—If these tasks are scattered, the Pablia Warks Department cannot cantrol the wark on them very well?—In my district the tanks are in a compact area; there is some difficulty with the laborers sometimes.

201. Q. (Mr. Rajaratna Malr.),—How many one man tanks are there in your district?—I counct say.

202. Q. Is the number large?-I bave no idea. They are not in our lists ut ull.

203. Q. Is any reduction of assessment granted to a man who owns coah a tank?—I do not know, the Callector can answer that question.

204. Q. You have referred to oircular and square wells; what is the increased cost of a circular well as campared with a squara oue ?-The circular one is less costly.

205 Q. Would not the stanes require to be properly dressed . for n circular well? - Evan then the cost is les-

206. Q. If the rayat finds they cost less, why does ho nat build tham?—They would prefer them, but they do nat understand how to build them. An ignorant man aan build n square well. Some skill is required to build n oirenlar one. Skilled labour is nat available. The rayat may make n raund well that will last 10 years, but I refer to the well which would last 50 years.

207. Q. Referring to the Gokak canni, what area coold be irrigated by tha supply now give to tha mills?—It depends an tha distance from the tank. I think the supply given to the mills would irrigate 30,000 acres, on the basis of the present 20 cusees mighting 5,000 scres.

208. Q. Would it be possible by some contrivence to bring back the supply from the mills to a reservoir?—Not unless year pump it. The fall is 180 feet.

209. Q. As regards the proposed extension of the canel, will that increase the area and the revenue?—Yes, 24 per cent would be the return on the large, scheme which will cast 91 lalhs.

- 210. Q. What sum has been spent on the Taosi tank?—R2,33,000 altogether, including land compensation. We have sold back the land since.
  - 211. Q. How much did the land fetch? -I do oot know.
- 212. Q. Wore not trial borings taken?—Trial pits were made, but no berigs. It was started in a hurry during the famine.
- Witness to President.—I would like it placed on record that I was very strongly opposed to the ctarting of the Tansi tank project.
- 213. Q. Are you familiar with field bunds or tale?—I have seen many tale, but I have never built any.
- 214. Q. Could a survey neefally be made in the interests of the rayats in regard to works of thet description ?-Yes.
- 215. Q. Woald you utilize fomine labour on them? -No, they would be too scattered. They ought to be put under Civil Agency.
- 216. Q Would you have those tals designed by skilled agency?—Yes, one plan would do for all. I would have the sites fixed by curveyors employed under the Collector.
- 217. Q. Do you think that the programme of tal works might be drawn up in time to be included in works to be carried out by familue labour under Civil Agoncy?—You. The best kind of Civil Agency works would be the building of tals.
- 218. Q. Do you think that they could be utilized to a sufficiently large extent to supersode large Pablic Worke in the famine?—I do not think so.
- 219. Q. Do yon think that they should be creeted on private lands and thet the owners should pay something as they do in the North-Western Provinces where they are called "nidel works"?—It might be considered.
- Mr. Ibbetson.—I do not think it would work very well. The conditions are different in the North-Western Provinces; there are big zonindars.
- 220. Q. Do you think that offerts might he made to extend fals as a protection against famine?—Yes, with the help of takavi a great deal might he done. But in this district they have exhausted all the takavi. There should, I think, he some law to enforce that the money advanced should be open tou the object for which it is granted. There ought, I think, to be a special establishment to look after takavi leans.
- 221 Q. (Mr. Ibbelson).—You are reforring, I suppose, to taken given out in famino years?—Yes; there is no record of the original condition of the well to be improved.
- 222. Q. In the observation of crops you uppear to have two classes, viz., monsoon ribi and het weather rabi. Can you give any idea of the relative proportions of the two classes?—We have practically us hot weather rabi crops.
- 22B. Q. Thou it may be taken generally that all are monsoon-rabi crops?—Yes.
- 224. C. Under monsoon crops you have two classes, vegetable and millots; I suppose the greater propertion is millete ?—Yes, quite 70 per cent.
- 225. Q. (Mr. Higham.)—To come back to the question of applications, I con quite understand that you require applications for rabi perconial crops in order to regulate the distribation of your eterage. But I understand that the only object of having applications during the monsoons is to provent the concedenat of irrigation?—I was speaking of the Gokak canal; as regards the mouseon crops, the object is to prevent illied irrigation.
- 226. Q. You have a Revenue establishment to that each outlet gots its turn for a prescribed time. Could not that establishment, during the kharif season, instead of troubing about how the water is distributed take a note of the fields irrigated?—The establishment of Patkaris gots only 127 a month cuch, and excepting the head Patkari and two measurers, the men are illiterate.
- 227. Q. Are they so illiterate as not to be able to do it in their own way?—Yes, they would have to find out the Survey No. and get the map to do the work properly. They are too illiterate for that.
- 228. Q. Sopposing the rule that those tacks the enucre of which contribute 10 per cent. towards the repairs should be taken up first, were done away with, how would you determine the order in which tanks should be taken up?—I would take up those tanks most in need of repair.
- 229. Q. Could you personally investigate which are most in need of repair?—I could do so during my anunal luspection, and would give orders accordingly.

- 230. Q. Supposing a new man came to this district, he would have your netes; but he would have to depend on the subordinate establishment?—Yes, I would call on the Revenue officers for records.
- 231. Q. Seppesing you had R3,00,000 to spend oo theso works, would you have much difficulty in determining which should be repaired first?—The tanks I have repaired so for have generally been the large ones. The others may often cest mere than 10 years' revenue.
- 232. Q. But aport from that, could you repeir them all at once; say some this year and some next f—There are very few deteils and it is hord to get information.
- 283. Q. There is no systematic record kept of information regarding tanks?—No there are no records.
- 234. Q. (Mr. Muir-Mackenzie).—You were once stationed at Ahmednagar and you are familiar with the Visapur tank. Do you think that thet project should be completed or left?—I know the Visapur project, as I practically began it. I have never surveyed the canal, so I would rather net hazard an opinion on the advisability of completing or leeving it.
- 235. Q Do you think it will fill ?—Yes, I think it will fill with \$\frac{1}{2}\$th of the run off in average yours.
  - 236. Q. And in bad years ?-It would not fill.
- 237. Q. What is the doubt about the canal; is it because the laud is not well suited to irrigation?—I think it is very well suited to irrigation, but a good many of the land owners would not take water in ordinery years. It is in the Bhima valley, and if the people get a good rainfull they would not take the water.
- 238. Q. Assuming that you had the water which now goes to the mills at Gekak available for irrigation, and you could irrigate, as you say, 30,000 ceres, would that be principally mens oo crop?—I meant that I would be able to irrigate 30,000 acres outside the monseon season—30,000 of rabi crops. Perhaps 20,000 would be nearer the figure, as we should have to draw off sooner.
- 230. Q. (The President).—On page 13 of the Report on Irrigation works, Bombay 1901, it is stated "In 1896 Mr. Ployford Reynolds as Executive Engineer for Irrigation. Dharwar, suggested the construction by famine relief labour of dams without elaborate arrangouente for water tight foundations. A note on this subject by Mr. Dunn, Superiateuding Engineer, Public Works Department, is attached. It is now suggested again that certain tructs of country would beaefit by the construction of what may be called 'kacheha tanks' formed by bunds, suitably drained to avoid slipe, but with no puddle trench. The fenction of such bands would be to heed up the water for a period and let it escape gradually, thus raising the surrounding aubscul water level and producing a small and more permanent flow in the nallsh below." I sappose it is something like a fal, only on a lorger scale. I notice that on page 15 of the same report you say:—"I believe there was considerable correspondence initiated by Lord Hurris' Government in 1892-93, or thereaboute, on the subject of raising the sub-soil water level in wells by means of what are called kackeha tanks in your note, and the conclusion arrived at, I understend, was that the results would be incomment surato with the cost." Do you know whether such knockeha bunds were made anywhere f—No; nothing more than a tal.
- 210. Q. I gather that something larger was contemplated—such a band as would retain water for a considerable period when the meason is over. It would not do to put a dam in a nallah as the force of the water would corry it away?—There would have to be made prevision for a waste were.
  - 211. Q. That would be expensive ?-Yos.
- 212. Q. (Afr. Ibbetson).—But you save the cost of a pudilie trench?—Yes, and you can make them where you have not get sufficient material for making a tank.
- 243. Q. (The President).—It would raise the sub-seil water level and the supply in the storage would also be kept up?—Yes.
- 244. Q. I think it would be a form of work which might be useful, and it is not oostly. Probably the bed would be used for cultivation after the water has been drawn
- Mr. Muir-Mackenzie-Such a tank would be empty every year.
- 215. Q. The water would probably percelate away by Christinas overy year, but some orep could then be grown in the bed, do you not think so?—Yes, I think it is worth trying.

Mr. P. J. Fitzgibbon.

#### WITHESS No. 77-Me. PURSHOTAN YOGHANDRAFPA PATIAVALI, Gokak.

Mr. Patiavali.

9 Jay. 02.

(Examined through an Interpreter.)

- 1. Q. (The President).—You are a landowsor in the Gokak Taluka !—Yes.
- 2. Q How much land do you irrigate ?—I irrigate 100 acres, but if the Gokak canal is extended I can irrigate another 150 acres. I own 250 acres.
- 3. Q. What do you oultivate?-Maize, chillies, juari and sweet pointocs.
- 4. Q. Da you grow crops all the year round?—Yes, I grow juari (kharif) every year. I irrigate it in years of drong bt.
  - 5. Q. Do you irrigate rice ?-No.
- 6. Q. Why not ?-It requires much labour and plenty of water.
  - 7. Q. When is rice eropped ?-On 15th Octaber.
- 8. Q. Would not you be able to give the erop plenty of water till thee?—Yee.
- 9. Q. Then why do you not irrigate rice? Becouse the staple food of the dietriet is juani. Some people irrigate rice.
- 10. Q.: If you irrigate the wholn of the 250 acres could you get sufficient manure? -I am afraid I could not.
- 11. Q. Then, without mnaare, it would be useless to irrigate the land ?-- Yes.
- 12. Q. What mounte do you use? -- Cow-dung and sheep manure.
- 13. Q. Da you find that you can get water when you want it?-No, the water-cupply is scanty.
- 14. Q. If you irrigate 100 aeres out of 250, can you get the necessary manure?—No, I grow only 50 acres of crap, because I cannot got the manare.
- 15. Q. (Mr. Higham.)—When you make an application for water, do you got it?—June 15th is the day fixed for application for kharif crop; but the application hos to be made before that?
- 16. Q. Do you always make it before that !-Yeo.
- 17. Q. Snppose a man wishes to irrigate his field after that date, what happens?—Ho will have to pay double rates.

- 18. Q. Do many people apply after the date fixed ?—No, they apply before the date fixed. No applications are filed after June 15th.
- 19. Q. Then if a man wants water ofter that, he would take it without applying ?—Yes, hat he would have to pay double rates.
- 20. Q. Are there many people who do that?—In a year of drought, when the people fear that rain will not come in time to save their crops, about 40 or 50 people would do co.
- 21. Q. Suppose o man applies for water, and then changes his mind, and does not irrigate his field ?—If he does not take the water, he is not charged.
- 23. Q. What is the date for applications for rabi crop?—15th October.
- 23. Q. Do the people know the date?—Yes, previous notice is given to the owners of land in each village.
- 24. (Mr. Rajaratna Mdlr.)—Is this notice issued overy year?—Yes, anunal notice is given.
- 25. Q. Do you think it will be n good thing to abolish the application system ?—I do not think eo.
- 26. Q. You irrigate 50 acres, and you can go on irrigating that until you wish to relinquish?—Different crops are gm wn hy rotation, and, therefore, the application system is accossary.
- 27. Q. Does the change take place frequently?-Yes, every year. The rayats change from kharif to rabi; the rates are different for different arops.
- 28. Q. Would the average area of coch description of crops be the same for any, ten years or so?—The areas are always changing; an owner may let his land to a cultivator, who would sow according to his own ideas.
- 20. Q. Are there facilities for sinking wells in your district?—You cannot be certain of getting weter.
- SO. Q. Supposing you could got water, would you irrigate ougar-cano?—Many people have attempted watering sugar-cano from the caualo, but have failed, os the wateroupply is insufficient.
- S1. Q That is why I suggest that wells should be sunk to supplement the canal supply?—Even then, they would not be sure of getting the supply necessary for watering angarcane.
- 32. Q. Would it not pay to a certain extent to eink a well to supplement irrigation?—I don't think it is likely that water will be found.

## THIRTIETH DAY.

## Belgaum-10th January 1902.

## WITNESS No. 78.-Mr. R. C. Brown, I. C. S., Collector of Belganm.

Mr. R. C. Brown. 10 Jan. 02.

- 1. Q. (The President.)—You are Collectar of Belganm?
- 2. Q. How long have you held that office ?—Six months. 3. Q. Where were you before that ?—I have been in Sholapn, Ahmednegar, Poena, Satara and Kanara.
- 4. Q. I see that you give in your memarandum at page 315 of Mr. Beale's report, the number of talnkas, which are liable to famine?—Yes. I think Athni is the worst.
- 5. Q. Ic there no hope of anything helng done there?

  No, there appears to be no hope.
- 8. Q. You refer to the Yndvad, Bheiranbati. Do they come nader Mr. Fitz Gibhon's scheme?—I think they would. (Mr. Beale explained that both these schemes here been rejected on account of bad foundations.)
- 7. Q. You say the portion of "the country lying round about Yergatti is the worst off ns regards water-supply and the Imperial irrigation tank wark of Yargauvi (entered in the famine programme) would be extremly useful in this tract. Do you think that the cultivators would take irrgation for their dry crops and get into the habit of taking it year after year?—Yes, I think they would, if the Gokak Canni is extended.
- 8. Q. Yon think that the extension of the Gokak Canal is a promising project?—Yes even if no storage is made, the kharif area would be extended.

- 9. Q. I understand that n part of the canal hoe been actually dng?—I have not eron it. I believe it goes neross the nallah. (Mr. Beala explained that n good deal of the earthwork had been done during the famine.)
- 10. Q. Do you think that there is a large field for the extension of well irrigation?—There is a large field for the improvement of the existing wells, as very many new ones have been constructed in the last five or ten years, particularly in Athni and Gokak.
- 11. Q. Have you given out large ndvances?—Yes, very large, especially lately. This is the fifth ouccessive year of femine in Athni.
- 12. Q. What has been the effect of drought on the wells in this taluka?—The people complain that there is very little water in the wells.
- 13. Q. Have they tried deepening? -Yes, but that was just year.
- 14. Q. In Sholapur, I believe it is being done?—I do not thick that it would be successful here.
- 15. Q. I see that a large our seems to have been spent on despening?—A good deal is ontered that has not been spent.
- 16. Q. I see from Mr. Lawronees's figures that in 1899-1900. Rs. 1,01,311 were given away in takari. How much of that was spent on wells ?—In 1900, out of Rs. 1,58,000 Rs. 37,000 were given for wells.

- 17. Q. In 1899 the whole of the Rs. 1,01,211 was for wells alone?—Yes, the decrease last year was largely dus to the indebtedness of the rayats, who had taken takavi largely in the previous year, and also borrowed from
- 18. Q. Do you think they would take it from Government, rather than go to the some ar?—They take taken in preference to going to the somear.
- 19. Q. How long will it take a man to get a takevi lean? This year, it has been done very midly. The District Deputy Collectors went to the villages themselves.
- 20. Q. Did it take about a month?-As soon as the officer audid got to the village, he made an enquiry, and gave the money at once. It depended on how seen he could get to the village. It may have taken a fertnight or three weeks.
- 21. Q. Was a large proportion of this takavi spont on subsistence?—Yes, a good doal of it was used for the purchase of food, etc.
  - 22. Q. Was there any check on that ?-No, not at all.
- 23. Q. (Mr. Muir-Mackenzie.)—Are not the works inspected P-Yes; I visited many of the places myself, and tound that the money was used in most cases freely on tanks, improvement of wells, etc.
- 24. Q. (The President.)—Did you give takavi for repairs of small tanks, otc.?—Yes, for tale.
- 25. Q. Are they in general use in the whole district?—Yes, in Athui, Chikodi, Parasgad, etc.
- 26. Q. Would it be a good thing to give them professional help in laying out tals ! Yes, I think it would be a good thing. They apply for takavi for tale and are very keen on such works.
- 27. Q. We lind eridence yesterday that the works are so scattered that they would not be of any use as rolled works?

  I think it might be done by putting a surveyor in charge of the works.
- 23. Q. Looking to the future, do you know of any better protective work for famine labour?—For a future protection the best thing in these talukas would be the improvement of wells. In regard to athul, if a tank could be built, it would be an excellent thing. It would provide for a certain amount of labour in bad years, and give a small orop.
- 29. Q. (Mr. Higham.)-liave you anything to say about amali villago tanks, or second olass irrigation works P—I have no personal experience. I have not travelled in parts of the District where they are situated.
- 30. Q. Did you hear what Mr. Fitz-Gibbons sald yestor-30. Q. Did you hear what air. Fitz-Gibbons said yestordny. I understood that in many eases, when the tanks da not fill as high as they used to, the land is re sold to the villagers, and that now that it is proposed to repair these tanks and make them hold water, it will be noccessary to acquire that land again. Would it not be pessible to make some arrangement much loss costly than acquiring the land; could we not let the people keep the land, and cultivate it when the water goes down?—Yes; it is necessary to acquire it.
- 31. Q. Do you think they would be satisfied if you relieve them of the assessment and charge only when they nctually cultivate?-Yos.
- 32. Q. (Mr. Ibbetson).-Of the wells made during the last five years in the insecure tracte, are near kachcha ?— There are a tromendous number of kachcha wells. In Athai there nro 42,000 kachcha, against 530 pakka.
  - 33. Q. Thoy are almost all kachoka?-Yes.
- 34. Q. Evon, samposing the people were ready to take taken to make them pakka, the value of the land in most cases would not cover the loan?—The value of the land as now encumbered would not allow sufficient taken.
- 85. Q. Do you think it would be worth Government's while to run a contain amount of risk in making advances, in view of the fact that the value of the land would thus be enhanced P—Yes, the making of advances would increase the value of the land.
- 36. Q. I suppose water would be found?—That is the great difficulty; there is no water in the pakke wolls.
- 37. Q. When did the water begin to fail ?- In the fourth year of drought.
- 38, Q. Then you doubt the advisability meat's running any risk in that way?—I think Government might risk further advances, if there is a fair chance of gotting water by some such plan as that suggested by Mr. FitzGibbon.

- 39. Q. Your only doubt is the precariousness of the Mr. R. C. mater-level ?-Yes.
- 40. Q. You have adopted, in famine times, a procedure which has enabled you to give out takavi much more rapidly than in ordinary times. Was the saving of time dae to the summary procedure regarding the enquiry P—Tao saving in time was not due to the inquiry being less careful, but it was more expeditions, because the Suh-Divisional Officer left his other work and make personal organics. on the spet.
- 41. Q. Could they not do that in ordinary years ?-They could not afford the time to do it.
- 42. Q. There is a tract in the south-east, where wells would he impossible ?—Yes, Parasgad.
- 43. Q. Elsewhere could wells be made saccossfully?—Yes, I think that wells might be distributed all over Athni and Gokak in the insecure tract.
- 44. Q. You say in your note, which Mr. Beale quotes, that in 1890-01, the whole of the insecore tract suffered from famine. Was that a real famine, like that of 1876-77?—I believe it was not I can only say from what I have heard from other officors.
- 45. Q. (Mr. Rejaratna Malr.)—You say that the Gokak Canal could be carried across a certain nallah. Could that extension be carried out at once, without waiting for the 91 lakhs scheme?—Yes, it could be done at once without storage.
- 46. Q. Could a large area be irrigated from it?-I do not know. It goes through a very rich tract, which is not irrigated.
- Mr. Beale explained that it depended on how far the oanal was carried. Even if it was earried five or six miles, a considerable area would be irrigated.
- 47. Q. What would it cost to carry it over the nallah. Is it a very broad stream ?—I do not know.
- Mr. Beale explained that the estimated rate was Rs. 80,000 a mile for the full-size canal.
- 48. Q. A great deal might be done by the improvement of existing wells?—Yes,
- 49. Q. Are there many wells which could be improved? Yes, a large number.
- 60. Q. Are they now in use ?-Yes, many of these wells are now working.
- 51. Q. Is there any difficulty in getting taken leans for this work?—The difficulty in getting advances taken is due to the fact that people have already taken so much money.
- 52. Q I find from Mr. Lawrenco's table that in the first ten yoars about 15 lakhs wore advanced under the Loaus Act. Would it act be useful to make a systematic inquiry as to how the money was spent P—It is no use unking inquiries as to past work. It would be a good thing to do so in
- 53. Q Advances are given in a lump; would it not be better to give them in iastalments, after inspection of the works; to see that the first instalment has been properly spent before giving a second advance?—I think it would be a very good thing; and would ensure a check on work done in futuro.
- 54. Q. On page 320 of his report, Mr. Beale says that the sapply to the Goksk Mills will shortly rise to the fall limit of 186 cubic feet per second. Is Government bound to raise the supply to that limit?—I do not know what the
- 55. Q. In the commanded area of the Gokak Canal, nro there facilities for sinking wells?—Yes, I should think so.
- 56. Q. A cultivator said yesterday that there were no facilities?—The water-level rises where there is a canal.
- 57. Q. Would it not be a good thing to affer special facilities to induce the rayats to sink wells P-Yes.
- 58. Q. That would lead to the extension of perennial ops?—Yes, sugarcanc is not grown owing to the uncertainty of the water-supply.
- 59. Q. I notice that a great many wells have been made in the Gokak Canal area?—One hundred and six new wells were sank in the Gokak taluka. Two hundred and nineteen pakka wells have been built in this taluka during the past fire years.
- 00. Q. (Mr. Muir-Mackenzie).—I understood you to say that your inspection showed that takavi money had been tolerably well speat on works. How do you infer then that much of the money was misapplied?—Lango

Brown.

- Mr. R. C.

  Brown.

  the most half, has been spent on the works, for which they were berrowed. But 1 have also seen works on which Rs. 1,000 have been spent, of which only Rs. 500 were advanced by Government.
  - 61. Q. Are you confident that the remainder of the advance did not go towards giving subsistence to the persons compleyed on the work during its construction P.—I do not think that much outside labour was called in.
  - 62. Q. So that the amount might represent the men's own labour ?-Yes.
  - 69. Q. Could not may misappropriation have been granded against by rigorous inspection?—The establishment was not safficient to place any check on the expenditure aluring the famine years.
  - 61. Q. In ordinary times, could not inspection be carried out? Yes, in ordinary years it might be done.
  - 65. Q. Admilting for argument that, in a fouring year, there is arisappropriation (about this Government has expressed considerable sloulet) in ordinary times could this misappropriation be prevented?—Misappropriation will not take place to may great extent in ordinary years.
  - [(Mr. Ibletson).—The whole question has recently been discussed by the Government of India and that Government has come to the canclusion, that, in ordinary years, the misappropriation is so small, that inspection was not worth keeping up.
  - (Mr. Muir-Mackenzie.)-The Bombay Government has a'so considered the subject and has come to the conclusion that the amount of mi-appropriation was very small.]
  - 66. Q Do you think that famine labour, if employed on fals, could be accessfully organised and supervised?
  - 67. Q. Would you do it by Public Works Department or Civil Agency ?- I would like the engineers to ndvife.
  - 63. Q As you cannot sink wells in Parasgrd, what form of protection would you advocate? Do you think that tale would be suitable?—I have not examined the anbicct.
  - OR. Q. Are there hills where tale might be made for No; the country I have seen is flat.
  - 20. Q. Are there other parts near the hills, where the lands are uncrea and where tale could be unde?—I do not

- 71. Q. As regards Mr. Higham's suggestion of leaving and which might be anbaceged by the tanks in the ownership of the cultivators would it not be necessary to compensate him in years when he could not cuttivate it?
- Mr. Higham,-My idea is that the assessment might be air. Mignam.—My idea is that the assessment might be abolished altogether, the cultivator rotaining the land. It would apply only to doubtful lands which are countines submerged and sometimes are not. Let the land be held free of revenue ou condition that we can submerge it when we like.
- The President.—They would not pay the land tax, even in the years in which they use the land?
  - Mr. Higham .- That is my idea.
- 73. Q. You say that the land is so encumbered that you cannot give more taken advances. Does that apply to the whole district P—No; only to Athui and in Gokak where very little more could be advanced on land sceurity.
- 73. Q. How much has been advanced f-In Athni Rs. 48,000 were advanced in 1891 for wells and other land improvements.
- '74 Q. The assessment of Athal is Rs. 1,48,000. Do you think that you have adrenced three your transmest.
- 75. Q. The land is worth twenty years' revenue?—I think so much has been advanced that the ordinary Sub-Divisional Officer would decline to take any risk, unless he has speoud powers.
- 76. Q. Is there any part of the famine tract of this district, in which you would advocate the extention of small tanks f-None.
- 77. Q. How do you account for the large area under wells in Sholapur (192,000 area) and Ahmedaagar (10,100 area) compared with Helganum (30,000 area)?—These two districts are practically of the same nature as Gokak and Athai in this district.
- 76. Q. But Rijapur le slill more so and yet there is very little well irrigation !—I think l'ijapur is flatter; in Sholapur there are many ups and downs and nallahs.
- (Mr. Muir-Mackenzie).—That would hardly account for the difference,

Wirness No. 70.—Rao Sanen Nabayan Ganran Nabole, Mamlatdar of Athni Inlaka.

Anerers to printed questions.

The information refers to Athni Toluba afone, which is a baily affected portion of the District.

Mr. N. G. Nadgir. 10 Jan. 02.

- 1. Culturable area, etc.—The gross area of Athal Talala, which lies on the northern frontier of the Balgatian Instrict, is 522,118 area, of which the culturable position amounts to 460,568 areas. 8,022 areas of land only of this area are protected by Irigation from private wells chiefly, an insignificant portion of 30 areas being irrigated by channels or pats from unliabs. The proportion of rultivated area to the area thus protected is therefore 58 to 1 in the actual times. This proportion is still reduced to 69th purt in a year of drought like the past year. The talaks is devoid of any Gorenment trigation works, probably on account of searly rainfall which is required to keep the tanks with a good supply of water, and of the difficulty of utillising the nater of the Krishna River, which flows from west to east throughout the southern portion of the talaka. An attempt was made during the famine of 1806 to construct a large tank by bunding up the Agnai Nallah near the villings of Tanushi by famine latour; but the project was abandoned as augmences ful after incurring an ouermous expenditure by Gorenment.
- 2. The soil of the taluka consists of soft black and "Larl" black meant or reddish light soil chiefty. The soft black roll is suited for almost all sorts of crops, dry as well as girden, requiring comparatively small amount
- of rainfall to give moisture, and when it is once completely wet for about two feet deep, it does not require repeated rainfall since it possesses the power of retaining mosture to produce erops; while the "karl" black soil, which is mixed up with particles of limestone or sand, is very hard to communicate moisture. It requires, therefore, more and repeated rainfall and is considered to be of inferior quality, though it almost equals with soft black in all respects when the rainfall is favourable and sufficient. The measure or light soil is chiefly used for kharif or early crops, requiring almost an equal quantity or rain with the "karl" black. It is not suited for the growth of what and gram and other late crops. All kinds of soil are suited for producing garden crops by artificial irrigation, and a quire couparatively small amount of rain for the dry crops they grow. Even about 15 inches of the full, distributed in the proper seasons throughout the year, is quite sufficient for the production of an average crop, and the failure of this benefit brings about distress.

  3. As has been stated above, the area irrigated by wells
- 3. As has been stated above, the area irrigated by wells in the taluka is 8,622 acres out of 466,669 acres of culturable land. It ensists of small patches of garden lands in some villages only where water can be reached at a small depth in the wells to allow of the drawing of water by the working of the not. Many villages are void of

gardens owing to the hopelessness of finding water underground. The following table will show the rainfall at the each month:—

\*\*Table 1. \*\*Table 2. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Table 3. \*\*Ta

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January *	•							•••		•••	***		•••	0 5	0 <b>4</b> 6
February		•	٠,					•	0 21				•••	***	***
March .							0 41	1 G8	0 5				0 55	0 24	0 43
April .				•		0 79	1 23	0 28	1 18	0 19	2 25	2 22	2 91	0 78	2 46
May					·	3 25	G 67	0 06	2 47	4 71	2 92	6 31	1 22	0 29	2 50
June						8 36	6 9	1 73	2 64	1 70	3 82	2 98	1 70	2 85	0 95
July .		•	:			3 42	2 26	3 10	3 69	3 8	2 43	0 85	0 30	1 95	1 72
August .		•				2 41	6 3	3 00	1 22	2 30	1 16	0 55	0 26	2 43	1 19
September						6 78	2 22	4 14	10 00	0 93	4 80	6 40	12 22	1 63	5 29
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December	·							,							
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The above will show that the fall has been very scarty and indifferent during a great portion of the period, notably in 1896, 1899, 1900 and 1901, with respect to the consonableness, resulting in the failure of crops and consequent distress among the people. A good quantity is necessary, especially in July and October at the latest, for kharif and rabi crops respectively, failing which, the crops suffer. In case late tains are at least favourable, much danger is not felt even if the early crops suffer since all available lands can be used for rabi crops. Northeast monsoon is generally favourable for the rabi crops, and it chiefly determines the situation of the senson.

- 4. The following kinds of crops are grawn in garden land by means of irrigation from wells, and the number of waterings they require are shown against each. They generally require water throughout the year excepting the rainy season, if it be favourable:—
  - 1. Sugarcane ... Twice a week for 11 months from March.
  - 2. Maizo ... Oaco a week for 3 months from May and Septembor.
  - 3. Sweet potatoos ... Once a week for 5 months from August.
  - 4. Wheat ... Onco n week for 3 months from October.
  - 5. Betel leaves ... Once a week all the year round.
    6. Juni hundi ... Once a week for 8 wouths from
  - April.
    7. Plantain ... Twice a week all the year round.
  - 8. Turmerio ... Once a week for 11 months from
  - 9. Juari Kadawal Once a week for 3 months from fodder for cattle. April.
  - 10. Chillies ... Once a week for 9 months from June.
- 11. Vegatables . ... Once a week for 3 mouths.

No irrigation revenue is realized in this taloka, there being no Government irrigational works of any kind.

5. Black cottan soil.—Black soil lands are generally very fertile, possessing moisture-retentive power and therefore not requiring repetition of showers. If they are once thoroughly hocistened before sowing moch rain is not afterwards necessary, and a shower or two during flowering period ensures a good outturn. This soil is useful both for dry and garden crops, and is well adapted for all kinds of into crops, especially wheat, ection and gram, which do not flourish so well in other kinds of soil. Small tanks constructed in such soil can hold water without any danger of absorption or leakage. "Karl" kind of black soil is consplouens for waterholding quality without any such danger, and high earthou dams made of it can safely be relied on, though soft black soil embankments may require stone-pitching inside. Masonry core wells may soldom be needed as the

rainfall in this that is very seanty. Well consolidated dams can be safely put up. But the question is as to the source of water-sopply of such tanks. There are no tanks for irrigation in this tahuka-probably not constructed owing to the difficulty of securing sofficient rainfall to utilise them. In fact they would be unfruitful job in the plain tract, if undertaken, except in some places by impounding nallahs on the slopes of hills. The black soil land does not, if soft, require irrigation for garden crops during monsoon, only if there is good rainfall; but it does require it in the remaining period of the year. No falling off is the irrigated area of such soil is observed in years of good minfall owing to sheek demand. People have certailly a desire for irrigation works on this soil, but they appear to be almost impracticable owing to want of sufficient rainfall to make them useful. If they would be successful they would indeed be very remunerative like the wells.

G. Wells.—The total area irrigated by wells in this taluka is, as stated in paragraph 1 supra, 8,022 acres in ordinary years and 6,735 acres in years of drought. The following table indicates the number of new wells, as also old ones deepened or otherwise repaired during the course of the last ten years. It represents also the extent to which their construction and repairs have been assisted by tagai advances:—

Year.	Total new wells con- structed.	New wells from tag ai adrances.	Repairs to old wells from advances.	Amount Ipaid for new wells out of advancer.	Advance for old wolls.	
1892	54 50 50 50 70 100 150 120 108	19 16 29 15 37 45 17 150 41 12	62 81 47 18 71 65 21 126 114 65	Rs.  3,815 4,000 2,520 2,430 10,300 6,128 2,300 32,011 5,913 2,800 71,717	Rs.  5,225 4 925 1,670 1,680 10,455 10,110 500 27,190 14,145 5,655 81,505	

7. The total existing wells used for brigation are reported to be 2,792, out of which about 1,130 only contained water more or less during the past year of famino, the rest having all dried up for scanty rainfall, though some of them have lately received a supply during the present rainy scason. No concession of any kind was

Mr N. G. Nadgır. 10 Jan. 02.

given to the constructors of wells, execpt that preference was given to them in the matter of giving tagai during the past years of famino. It is certainly desirable to stimulate the construction of new wells by more liberal paymonts of advances, and attempts are being made in thet direction co far as the security for edvances and the nature of the soil would permit, as will be seen from the figures given in the table nhove. Perhaps remission of interest on such advances, if not of a portion of the advance itself, would encourage the people to some extent to construct new wells with udvantage on u lerger scale. Numerous wells rand dry during the course of past years and most of them were despend with henefit. Some did fail, or were abdudopth of water in the wells below surface is eight feet, and the cost of kachaha wells need for irrigation varies from Rs. 150 to Rs. 500 according to the depth and nature of und the cost of kachcha wells need for irrigation varies from its. 150 to Rs. 500 according to the depth and nature of soil to be excavoted to reach sprioge of water, pakka wells of averoge dimensions cost up to Re. 2,000. Wells tree worked generally with one mot, though there are many with two or more, which work only when there is an incient water-apply in a good year. The area irrigated by a well with one mot is from 2 to 8 acres of garden lard. Some attempts have been made in the taluka by boring with a crowher in the hard rook, noder the native method, down to the water spring, and they have proved successibility in a gone cases and have therefore heen advantageous in the eeasone of drought. the eeasone of drought,

8. Relief Works .- Relief labour was omployed in this taluka, mainly on the road works, during the pest two years, end the total amount expended on them would he approximately Rs. 70,900 in round sum. The maximum number of workers on one day amounted to Rs. 11,160 during the month of July last. The works were as

Athni-Honavad Road, Athni-Kagrad Road, and Athni-Anentpur Road.

9. The Kagrad and Bijapur Provincial Road, which is in progress, is still left incomplete, and its completion is

- highly desirable since it connects two important commercial centres, namely, Atbni and Bijappar, to the railway station at Shedhal. Great difficulty is experienced for traffic in this taluka for wont of good made roads and communication is hompered thereby, which renders the carly completion of this road essential. It would tend to increase the facilities of communication, especially in the mossoco, during which time traffic is etopped to some extent owing to the old road getting muddy.
- extent owing to the old road getting muddy.

  10. I should here mention that a lerge relief work, nomely, construction of a tonk for irrigational purposes, was started near Tannshi by impounding the Agrani Nalloh during the famine year 1896; hat, as hos been etated above, it was abondoned after incorring an enormous expanditore. It would he a great hoon, as a protective measure, if some way be found out to get this work saccessfully completed so as to irrigate the lands it would command. This would alleviate the distress to some extent caused by the effects of famine which as of late heen unfortunately recurring in this taluka where the crops unfortunately recurring in this taluka, where the have soffered more or less sioce the familie of 1896.
- 11. There may also be found in the tainks a few enitable sites to construct tonks for irrigational purposes by bunding up nallahs on the slopes of small hills, though I amount present unable to say whether inoy would on successful and safficiently romunerative; but they would prove very neeful as protective works. It would be for the prefessional persons to decide and fix about these works.
- 12. Before concluding I would with great diffidence snggest, as a layman, an expensive, protective and oseful echeme for the consideration of the authorities. It is the construction of a canal passing west to east through the northern portion of the talaka, by directing the water of the Krishaa River hy means of a dam constructed at some point in the north-west corner of the teluka near Shedbal, I cannot of goorse are whether this maintains. leannot of coarse say whether this project is feasible, but if it be possible to execute it, it would offord an everlasting boon to the greatest portion of the taluka and protect people to a great extent from foilures of crops so-severely experienced doring the past famine years.
- 1. Q. (The President) .- You are Mamltadar of Athni?
- 2. Q. How long have you been there ?- Ahout 2; years.
- 3. Q. You have been there during times of drought and familae?-Yes.
- 4. Q. Sioce 1899, the famine has been very had ?—Yes. The famine wes rery had in 1899.
- 5. Q. You show that protection by irrigation is only 58 to 1 in ordinary times ?—Yes.
- 6. Q. That is almost entirely by wells?—Yes, only a small portion by channels and nallahs.
- 7. Q. In paragraph 6 of your printed memorandum four chow that the number of wells has increased during the last four years. There seems to be a large difference in the amounts advanced in 1899, Rs. 32,011; in 1900, Re. 5,913; in 1901, Rs. 2,300; why was there u sudden increase in 1809?—The increase in 1899 was due to the large advances of the last in the foreign of takavi in the famine.
- 8. Q. You show in the same table that in ten years, of 850 new wells 381 were made from tekevi; more then half therefore, were made by the people without assistance. Did they go to the sewcar for the mocey?—Some of them
- 9. Q. In 1899, 115 new wells were made from takari in the following year, ont of 120, only 41 were so made and in 1901, 12 ont of 106. Are these wells kachoha and in 1901, 12 ont of 106 or pakka?—Mostly kachcha.
- 10. Q. liow long well they last?—10 or 15 years where the soil is hard.
  - 11. Q. Are they huilt up on the mot side ?-Yes.
- 12. Q. Whot is the sub-soil. Do you require to go through rook ?-Yes.
- 13. Q. I sappose that just now a great number of wells are dry?—Last year the number wee very great; but the June and September rains brought a little water to some of
- 14. Q. Is the water level rising ?-Yes, it is hetter than it was last year.
- 16. Q. You say, " perhaps, the remission of interest on such advances, if not on a portion of the advance itself, would encourage the people to some extent to construct out

- wells with advantage." Do you think the interest high?
  —The interest at 5 per cent, is a little high.
- 16. Q. But the sewear charges more than 5 per cent.?— es; but if the interest were remltted, many more wells Yes; but if twould be made.
- 17. Q. You suggest that a portion of the adrance might be remitted ?—Yes, that would be a great boen.
- 18. Q. Do you think that people would he pleased, if, instead of giving the measy, on secessmeet was charged?—I doubt whether they would take the loau under these conditioes, as they would have to poy an annual wet assessment, which would last for over.
- 19. Q. Are the wells pretty nearly always used futhose that contain water ore all mod. The people their best to get water; but the supply is very seanty.
- 20. Q. What are the chief crops grown under wells ?-Maize, ewest potutoes and juari; also a little cane.
- 21. Q. What is the chief food of the district ?- They majotaio themselves chiefly upon juari.
- 22. Q, Do they irrigate fuari?—There is a special kind of fuari, which they irrigate, which is called hundi. It is only sown in gardens; and is watered.
- 23. Q. (Mr Muir-Mackenzie).—It is grown in the hot weather?—Yes.
- 24. Q. Is kadava juari growo under wells?—Yes.
  25. Q. For grain ?—Hundi for grain sud fodder; ond kadava for fodder only.
- 26. Q. (The President).—Is there anything that can be done for the Athoi taluka, to canble it to withstand famine?—I think that tanks might be tried.
- 27. Q. You suggest a canal passing west to each by directing the Krishna river "by means of a dam at northwest corner of the taluka, near Shedbal." Has thet been examined?—I do not know.
- Mr. Beale.—I examined it. But I think it is impossible from that point. If we strike out higher up, we might do it. It is a question of commond and of expenditure. There are two native States through which it would have to pass.
- 28. Q. I understand that there are not many tanks in Attail?—I could meetion four or five old ones that are silt-thurp, but they could be improved.

29. Q. Why are there not more tanks?—The country is very flat. And neer the hills water connot he obtained.

\$ 1,5

- 30. Q. Do the people often try bering?—They try; but I know only four or five instances, in which, after going forty feet, water hos been found.
- 31. Q. Do the people do the borings themselves?-
- 32. Q. In what proportion do they fail to find water ?-In 75 per ceut.
  - 33 Q. How much does such a horing cost ?-Rs. 50.
- 34. Q. How deep do they go ? About 40 feet.
- 35. Q. Not deeper P—Their appliances do not permit of it. They use an ordinary jumps.
  - 36. Q. Would it he a good thing to lend them boring tools?—We have already supplied one; but people could not moke use of them. The Public Works Department worked it. They tried it in the compound of the travellers' bungalow; and they succeeded in finding water after going 30 feet with great difficulty at a heavy cost.
  - 37. Q. You say that only eight thousand acree are irrigated by wells in the whole of this district, in which there is four lakes of culturable land. Do you think, therefore, that there is great room for the extension of wells? I think you might double the area.
  - 38. Q. Could you go on doubling it, till you make it ten times, provided you had manure?—It is difficult to find cites. The people would have gone on building wells, but for this, and also for the fact that many have built, hut failed to find water.
  - 39. Q. (Mr. Ibbetson).—You say that in some villages water can be got at a reasonable depth, and the people there have wells; but that in others the water is too deep, and, in consequence, three quarters of the people who sank wells failed to get water. In what proportion of the villages is water obtainable ?- In about half.
  - 40. Q. In villoges, where wells are possible, can they get water all over the villages f-No, they would have to select proper sites.
  - 41. Q. In those villages, where it is possible, would they he chie to sink wells in half the area f-No; there 210, small patches of from one to two acres.
  - 42. Q. Then wells are not possible in more than enequorter of the whole area ?—No.
  - 43. Q. Your takavi advances average Rs. 200 per well; are those kachcha wells?—Rupees 200 is coough for a kachcha well about 30 feet deep.
  - 44. Q. Would that well have mosonry on the met side? Yes.
  - 45. Q. How much will it cost to make that well pakka? -About Rs. 1,000.
  - 46. Q. Would it be made by dry mosonly?-They do not use dry masonry gonorally.
  - 47. Q. How much of the 30 feet that they have to dig would be rock?—About half, the other 15 feet would be surface soil and muram,
  - 49. Q. And the other 15 feet would cost Rs. 1,000 to make pakka ?-Yee.
  - 49. Q. Do you think that Government could safely odvanco money to make these wells pakks ?-Only if the owners have good security to offer.
  - 50. Q. Have they not got security to offer ?-No; lately the resources of the people have been taxed to a greet extent. And not more than 5 per cent. have any security to offer.
  - 51. Q. You tell us that a lorge number of the wells have dried up. What hoppened in 1899?—There was water till the end of 1900. In the first year they did not fail at all. The Soptember rains of 1899 were very heavy. The failure began in December 11 00; and lasted till June 1901.
  - 52. Q. What hoppened to the wells in Athai in 1896-97? They were dry; since then we have hed successive famines. -
  - 53. Q. (Mr. Muir-Mackenzie).—Con 'you tell us how much takavi has been advanced during the last two famine years P—In 1899-1900, one lakh thirty thousand; in 1900-01, seventy thousand, making a total of Rs. 2,00,000.
  - 54. Q. That does not represent one and a half year's revenue ?-No, about one year's.
  - 55. Q. When was the last Revision of Settlement?-In 1886.

- 56. Q. You have only advanced one year's revenue; Mr. N. G. what is the value of the land in the taluka; wes there not snough of scourity in land for further advances?—Ws advanced the money only to the poorer people, so as to give them employment. We did not give it to the richer pcople.
- 57. Q. But that did not increase the number of wells in the taluka, if you gave it to the poorest people?—We might advance more money to the richer people to make wells. The greater portion of the money paid was for other improvements of land.
- 58. Q. You could not advance much more money to the poorer people?-No, we could not safely advance much to thom.
- 59. Q. There are nine thousand holdings in the tuluka; ond the assessment is two lakes; therefore, the average assessment on each holding is Rs. 22: well, I suppose, you could very safely advance to a good many of those people twenty times the assessment?—We might advance twenty times the assessment to a selected number.
- 60. Q. Most of the ndvances have been given to holders who pay less than Rs. 22. Was not the land of these people already encumbered f—The encumbroness ore taken into
- 61. Q. But, if the Government has prior claim, why consider the encumbrance?—We only edvance mouey on unencumbered land, to be on the eafe side.
- 62. Q. Do you think that the greater part of the advances for wells and tale has been spont upon the objects for which the advances were obtained ?—Yee, most of the meney. I personally inspected most of the works.
- 63. Q. If a man get Rs. 200, how much do you think ha epont P—At least Rs. 150, but it must be taken into account that he did mest of the work himself.
- 64. Q. In Athni, what did the people toke takavi for, chiefly for wells or for tals !- Both, but tals consumed a larger amount.
- 65. Q. Is the country good for the building of tals?—Yes; need to the tokavi was given for tals. The people prefer wells; but they cannot afford to have them.
- 66. Q. About these four or five old tanks, which you mentioned, were they ever, in former times, used for irrigotion?—It is said that they used to be.
- 67. Q. In what part of the taluka, are they situated ?—In the north-eastern part.
  - 68 Q. Near the hills !- Near Taosi on the hill side.
- 69. Q. I suppose they could be used for retaining water in the wells ?—Yes, they are now turned into dry crop
- 70. Q. How many trials were mode with the bering machine, leut by the Collector in your district?—Only one; that made in the travellers' bangalow by Public Works Dopartment,
  - 71. Q. How deep did they go ?-About 30 feet.
- 72. Q. That is because nobody knew how to work it?—Yos; the Public Works Department tried; but they could not work it advantageously.
- 73. Q. From the statistical Atlas, I'find a great difference between the lands irrigated in Atlani and Chikedi. There is less irrigation in the former than in the latter P—Chikedi
- bordors on the glasts; and there are mallahs, channels and wells there. But, further east, there is a serious falling off.
  74. Q. You say that the people think the extension of tals better than the extension of wolls?—The people borrow for tals as well so wells; but the difficulty about wells is to find sites; and when sites hove been found, to find water. Therefore, I consider the making of embankmente better.
- 75. Q. Having regard to that difficulty, you think it botter to give advances for fals than for wolls ?- Yes; the people know the benefit, and some crop is usually to be had above these tale.
- for well were given in the famine year to the poorer people. In good years, when the water comes back to the wells, will they be able to get labour and manure to grow garden orops under them P—In Athni there is little or no manure used. 76. Q. (Mr. Ibbetson).-You say most of the advances
  - 77. Q. Do they grow maize without manure P-Yes.
- 78. Q. So that no difficulty will occur in growing first class crops when the water-supply comes back ?—No.
- 79. Q. (Mr. Muir-Mackenzie).—Thoy will use the mnauro from the cottle P—Yes; they will ase their own entile manure for engarooue, as only a very little will be re-

WITKESS No. 80.-Rad Bahadun V. S. Koppikan, District Deputy Collector, Belgaum.

Answers to printed questions.

Mr. P. S. Koppika-10 Jan. 02.

#### A .- GENERAL.

Gokak Canal Irrigation.
The answers below refer to Gekak Talaka.

- 1. I have been in charge of the taluka as Sub-Divisional Officer for about nine months.
- 2. Statement of average monthly rainfull at Gokak is appended.
- 3. (1) The following obstacles to the extension of irri-gotion in the villegee commanded, by the Gokak Canal
- (2) There is no sufficient stock of cattle required for the sapply of mannre. The rayats are unable to keep large slock on account of want of means and fodder.
- (3) Vide answer to No. 2. The samply of manure is not enflicient.
- (4) All sorts of soils commanded by canni do suit irrigi-n. There is no obstsele on this point. tion.
- tion. There is no obstsele on this point.

  (5) Yos. According to the rates new in force, the irrigation for kharif and rabi crops is not commenced before 15th of June and 15th of October re-pectively. The supply of water is reduced after 15th of December. Consequently the irrigators of lands that are at a distance from the main canals do not get water regularly. If the reservoir fills in and the supply of water be available, the irrigation for the kharif crops should be commenced any time after 25th of May and for rabi crops from 1st of October and for summer crops from 1st of Febraay. The period now fixed for the filling of the applications for permission to take water is 15th Jane, 15th October and 15th February for the kharif, rabi and summer crops respectively. This limit should be relaxed in times of drought and extended to 15th of September and 15th of November in the case of kharif and rabi crops and 15th of November in the case of kharif and rabi oreps respectively
- (6) Yes. But this obstacle can be removed by advance of takavi leans.
- (7) Formerly the water rates were very low. They were radually enhanced from two to four times. The condi irrigation is not, therefore, availed of for the total frrigable area in the villages where caust passes.
- (8) Yes. Especially in the case of lands owned by non-agriculturists and Inamdars.
- (9) On neceount of droughte agriculturiets and agricul-tural labourers from affected parts have come to the canal villages and have taken to cultivation.
- 1. List of sueb persons is appended. The rayats of the villoges adjoining the canal villages cannestly desire the extension of canal to their lands. The Gokak Canal with its Shindi Nallah extension irrigates, at present, the lands of 15 villages. If the canal be taken to the north of the Kalleli Nallah the irrigotion may be made available at least for the kharif crops in many villages. If it be so extended, necessary return on the cest of extension will, it is hoped, be obtained from the water rates since the rayats of these villages are anxiously applying for its extension and on necessary returns on the cest of extension and on necessary cannot be successed. loges are anxiously applying for its extension and on ne-count of frequent droughts to which the villages are listle. The Public Works Department will be in a better position to ento why this irrigation is not so extended. This is in my opinion, e metter that necessitates serioue consideration and early action, if the extension he possible.
- and early action, it the extension he possible.

  4. Section 107 of the Land Revenue Code guarantees against the enhoncement of the assessment in case where improvement to lands ore effected by holders of such lands. Improvemente at heavy cost, both from private capital and with the assistance of takavi leans, are made in the talaka. Since then no revision is made. Tonants do not generally undertake costly works of irrigation unless they acquire some sort of permanent right over the lands from Isad-warers.
- 5. Lonns under the Land Improvement Act are freely token by the people for the extension of irrigation—
  (1) The rates of interest me sufficiently easy.
- (2) Remission of interest may be granted in case of wells and other inigation works which fail after the recipient has honestly executed the completion of the works nudertakon by hlm.
- (3) Partial remission may also be granted in the case mentioned in No 2. Rules to regulate the semo with necessary conditions seem, however, necessary.

- (4) Same as No. 4.
- (5) No extension of the period for repayment appears necessary.
- (6) Grants-in-aid may be given in exceptional cases where the takayi debtor failed in his work honestly under-taken and thereby exhausted his resources and no further grants under ordinary rules are possible.

#### B .- CANALS OF CONTINUOUS FLOW,

#### Answers to Section 7.

The cenal irrigation increases the value of the produce as

- (1) The two harvests possible within eight mentbs are:

  kharif, maize, onions, sadak, hersegram. The inejerity grow
  moize as second erop. I therefore take maize as a guide,
  By rains 1 arre, on an average, grows 4 "Hairs" (each.
  "hair" is of 160 seers of 80 tolas each) either kharif or
  sheleo juari with varielies of row crops along with it about
  1 "hair." The value of the produce in normal years is
  about Rs. 6 per "hair," thus making a total value of
  Rs. 30 and fodder worth about Rs. 2. By irrigation the
  first crop of maize yields about 6 "hairs," the second 3
  "hairs." The maize is valued at about \$\frac{2}{3}\text{the fodder worth}
  Rs. 4-8 per "bair"—, thus the total outturn is Rs. 40-8.
  The fodder when dried up becomes useless and brings almost
  novalue. It is, however, used when still groen. I take annas
  8 value of fodder. The total value of product is, therefore,
  Rs. 41. The difference is therefore Rs. 9 or 28 per cent.
  It should, however, be noted that the growing of the irrigation crop is much more costly requiring manure and onstant labour and the net increase msy be considered to be 10
  per cent. (1) The two harvests possible within eight mentbs are
- Note.—The canal irrigation is said to be too cold and in-ferior to that of well irrigation, and therefore the produce is also less. The produce of animaignted aero given above is of good land in a year of good ramfall.
- of good land in a year of good ramfall.

  (2) The crops that could be substituted are of longer duration, viz.—Paddy (five months), chillies, ground-nut, ewest-petatoes, and cotton (seven or eight months), engareane and plantain-trees (12 months). In the case of the last, sugarcane and plantain troes, the value of the preduce is much increased. Sugarcane yields about Rs. 200 gross value. Plantain-trees bring no income first year, but from the second to fifth year bring ubout Rs. 225 per acre, sixth and seventh year about Rs. 100, the avorage of seven years being about Rs. 160. But these crops are not generally grown on account of the uncertainty of irrigation throughout the year, and these that tried are said to have suffered loss. Betel-leaves and fruit trees are not tried. The remaining crops do not increase value or reduce the value, to speak of, if compared with the outturn of malze with two harcests. Kharif juari with varieties of row crops is grown by irrigation, and in that case the value of the produce is reduced to about Rs. 25 per acre compared with Rs. 41, the value of two maize harrests. But there is a proportionate reduction in the payment of water-rate.

  (3) The yield is not increased by irrigation:—
  - (3) The yield is not increased by irrigation :-
    - (a) in e year of ample rainfull, because the canal water is not generally utilized,
    - (b) in a year of scanty rainfall, the irrigators take water when necessary, and the increased produce, on an average worth annas 8 per acre is obtained,
  - (e) in a year of drought the crops are grown only by irrigation, the whole yield is an increase compared with erops in the neighbouring affected
- 7. Section 8.—The approximate estimate of the increase in the total annual value of the produce due to irrigation—
  - (1) Rupees 9 on the avorage of normal term of years.
  - (2) The prices of steple feed grains being doubled, Rs.
    108 in a year of drought. But the cost of watching against depredations by affected population and wild animals is much.

Section 9.—The approximate annual average rate per acre paid on account of irrigation is—

(1) By the cultivator, who chiains permission, on application to Government, as water-raic.

<sup>·</sup> Not printed.

- (a) Re. 1 for kharif juari, bajri, navani, ragi, sanvibarga, some rate even if the above are mixed with row crops of tur, kulthi, gram, etc.
- (b) Rs. 2. first erop of maize, first erop of cotton if mixed with kharif, juari in rows, onions.
- (a) Rs. 3, rabi maize, horse-gram, sadak, brinjal, vego-tables, second crop of onions, garlie, carret, rabi
- (d) Rs. 6, paddy, chillies, ground-nut, sweet-potataes.
- (c) Rs. 8, from 15th February to 15th June to the orops mentioned in clause (C). But none takes woter on necount of insufficient supply at this
- (f) Rs. 16 far the chillies sown for the purpose of transplantation from water taken between 15th of April and 15th of Jane.
- (g) Rs. 20, plantain trees, sugareone and betel-leaves.
  Fruit trees far which water is taken 12 months. Note.-No rate above Rs. 20 is levied.
- (2) The reut paid by the enlity to the owner of the land in the force of cubancement is 25 to 50 per cent. more than what it was before irrigation, say, on on average 15 to 2 times the assessment. The overage assessment is annas 4 to lie. I, and in few places its. I.4 and 1.8. The quality of the soil is mordi, karls, black soil, light black soil, masser (sandy mixed with red sail), sandy lond silted ap with deposit of black earth and another quality of soil generally called halmanh where plantain trees are grown. This soil is generally close by village site.
- (3) The owner does not pay any rate in excess of the assessment, unless he is a partner with the coltivator. The water-rate is essessed on the area actually irrigated subject to the minimum of one acre in the case of erops mentioned in section 9 (1) (a) and in case of rest 20 genthes. In the case of pat numbers or sub-divisions separately demoreated by the Irrigatian Department, the Minima abovementioned is not applieable. There is, however, no sub-division below 10 genthes.

Section 10.—The private expenditure to bring water to a field depends on the distance of the canal from which the branch is to bo taken. The cost is about 4 annas 100 running feet. If public path intervence, the cost of the con-struction of a drain has to be borne by the irrigator. The repairs to the canal cests balf of the original expenditure and they have to be made once in two years. The cultivator is allowed to do the work if he likes and in ease of his default the Irrigation officer executes it, the cost being recovered from the cultivator.

- I. To prepare the land for irrigation, the cost depends according to the level of the land ineven or otherwise cultivated er woste from Rs. 10 to Rs. 100 per acro.
- II. The cost of preparation of land for irrigation is generally barne by the owner of the lond and not by the towart. The further up-keep is looked after by the tenant, i.e., cal-

Section II.—Without manner no crops ore obtained by canal irrigation. Manuring by unking at least the slicep sleep in the land becomes necessary. No cultivater therefore sows seeds without manuring the land, if the crops are to be grown by ennal irrigation. If the sowings are made to be grown by enual irrigation. If the sowings are made by rain-water and enual irrigation is nonlied of to prevent withering of kharif juari, 4 annus crop is obtained. If erops are grown without manure, they do not ripeo and generolly fail, and the land becomes useless for the further growing of any crops that year.

- II. If irrigation be profuse the crops fail, unless enriched by further monoring.
- III. Extensive irrigation is not resorted to by a cultivator, the maximum area cultivated being 10 or 12 acres.
- IV. The cultivators take care to avoid damoging by frequent irrigation.
- V. Water logging destroys crops and makes the soil soltish.
- VI. Hero and thore salt offloresoence is created, and the area under salt efflarescenes is about  $\frac{1}{2}\pi th$  of the total irrigated area in the villages of Arbhavi and Balobol. In others it is nınclı less.
  - VII. The lend is not spoiled in any other way.

VIII. In the case of the land spoiled, as in VI, salt is eroated on the surface. The soil tastes brakish, and looks like khori land losing its tenacity. It does not even grow genes. It is generally low-lying ground, and the cause appears to be due to the constant meisture creeted by percolation and water logging from the edjoining high lands which obtain irrigation by canal. The sample of surface salt and the carth below are enclosed. No remedy, is as yet attempted. It is, however, thought that if fresh earth ba taixed up, the land might agoin grow crops.

IX. The irrigation is of about 18 years' stonding and the land commenced becoming saltish (vide No. VI) two years after the use of the canal water, and the area increases year by yeor.

X. The evil is gradually increasing.

XI. No experiment has yet been tried by draining irrigated fields.

#### C .- CANALS OF INTERMITTENT FLOW.

There are no existing canols of the sarte. Se no answers are necessary for questions Nos. 12 to 21.

22. I consider it advisable to encourage and assist construction by private persons and I mandars of canals of this sort. This is possible in several villages where there are nellabs which flow high water two or three times in the roiny season even in those of droughts and in villages where there is Isrga number of irrigoting wells, which have now failed, on account of failure of the flow of water in the nollahs adjaining them. I think canals of this sort are essentially recaired and will say helplost rays from are essentially required and will save helploss rayats from nsoless expenditure now incurred by them in sinking their wells deeper and deeper with little saccess. This can be done in few cases by advance of large taken loans to sabstantial land-holders, including Inamdars. Government can, however, construct such works in selected places, assessing the water rote ou the irrigators who will be benefitted by them.

#### D.-TANKS.

There are no irrigating tanks and no answers are therefare necessary for questians Nos. 23 to 31.

32. Vide answer to No. 22 above.

## E.-WELLS.

I have not travelled through all the parts. I have, however, seen the villages in the north, viz., Mudaigi, Mugalkhad, Hondigund, Nagnur, Palbhavi, Salianpur, Shivopur and Khanhatti. These villages have good many irrigating wells, the average depth is from 25 to 40 feet and naw nearly half of them have got dry; others have scanty supply. Many of these wells are dependent on the extent of the moisture retained in the adjoining nullahs in these villages. If the nalloh water be impaunded and tonks inado the supply in mojerity of these wells will instrumly in-crease and the villages will be able to get through famino years without much difficulty.

List of persons that have settled in canal villages to take advantage of irrigation coming from other villages.

- 1. Lokkya Mudakapa, former resident of Gokak, a cultivator, has come into Arbhavi and settled there as towart of irrigated lands and cultivates 8 ocres.
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- 5. Bahippa Jivapo. Fram Hukeri to Arbhavi, cultivates 8 acres, as tenant of Gangabai Gosavi.

There are severel other cases.

### WELLS.

81. (1) The only water-bearing tract in the taluke is the narrhern portion called Mudaigi Bhag of the taluka. The noture of the soil is mardi consisting of hard muram on the surface with soft stene-beds below, easily workable. The cost of digging is easy and of masanry construction, much reduced in consequence. This tract consists of (1) Nag-nur, (2) Mudalgi, (3) Hallor, (4) Mugalkhod, (5) Palbhavi, (6) Sultanpur, (7) Handigund, (8) Kopalgudi (9) Shivapur, (10) Khanhatti. The curface in these is undulating. The average depth of permanent wells in an ordinary year is 25 feet.

The rest of the taluka has been exploited during the last four or five years from takent leans. It eensists of :---

- (a) The rocky tract to the south-west and south-east,
  - (b) The eastern pertion of the taluka.

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The first is traversed by range of bills and consists of sandy sarface with hard sand-stones under it. It is very expensive ta work in this and then the water-sapply is nat plentiful. The second is an even stretch of black soil with granite beds under it. The depth of wells in the rocky tract is abaut 25 feet. In the black soil tract, irrigatian is only possible on the banks of large nallahs capable of holding water in their heds. Such nallahs are few and far between. On the banks of uallahs water can he had at the depth of 20 feet. The tracts further from the nallahs are nuworkable, even at n depth of from 50 to 60 feet. The only oxception to this is the village of Konjalgi which is similarly situated in this respect with the mardi tractin similarly situated in this respect with the mardi tract in the north. As this tract is most liable to drought, the only thing possible is by damming the unllahs and hoarding rain-water in large reservoirs.

- (2) In the water bearing tract the supply of water is both from springs and percolation. Easily as the water is tapped in ordinary years, the supply hegins to fall short and the owner has to dig deeper in a year of dronght. In this tract the water never gets saline nor in the rocky tract. It is only in the eastern tract where the water is saline, except what can be got near the nallahs.
- (3) The average cost of construction in a mardi or muram tract to the north is of a well of 24 × 24 × 24 feet 500 or 600 rupees with 3 yats (leather backets) over it. In the rocky tract the cost is Rs. 1,000.
- (4) A new well constructed will last for about 10 years without repairs; then it will have to undergo small repairs at intervals of five years.
- (5) It is raised by means of large buckets made of bide y bullocks on an inclined plane. There is no other device by bullocks on an inclined plane. resorted to.
- (6) The uverage area commanded by well for growing vegetable and maize is 4 sares; for growing valuable crop, such as plaintain, sugarcane, and betel-leaves, it is possible with one 'mot' (backet) to irrigate only one acre.
- (7) In a normal year almost the whole as mentianed in No. 6; in times of drongbt one-fourtb or less.
- 35. When this truet becomes irrigated the ont-put per nero is increased by one or two processes. It is possible to raise two crops of different kinds, and in the case of maize, the same kind. It also becomes possible to raise more valuable crops, such as plantain, sugarcane and betel-leaves, which is very rare. The ont-turn per acre of average soil of unirrigated orop in a year—

						Rs.
Of moderate rainfa	ll is	:		•		22
The ont-tarn per such year is .	aere	of i	rrigate	d erop	in	40
puco jeni is 4	•	•	•	•	-	
			Differe	nee	٠.	18
Unirrigated crap, g	and se	il an	d good	min	•	32
Irrigated crop	11		11		•	ō0
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(3) In a year of drought, while the out-put in an unirrigated soil is reduced to nought, the value of that in an irrigated area is doubled, though the extent of cultivation is reduced.

- 1. Q (The President.)—You are District Deputy Collector in charge of the Athni Division?—Yes.
  - 2. Q. How long have you been there?-For nine months.
- 3. Q. Where were you before that ?-I was Mumlatdar of the Dbarwar District; and after that, I was Chituaris to the Collector of Belganm.
  - 4. Q. You know the Gokak Canal tract very woll ?- Yes-
- 5. Q. You say: "I beg specially to invite your attention to the accessity of the extension of the canal to the villages on the north of the Kalloli nallah, for the parposes of irrigation, at least during the rains." Is that the nallah to which the canal has been made?—Yes.
- 6. Q. I naderstand that beyond the nallah the earth-work was made by famine labour f—Yes, daring the old famioe.
- 7. Q (Mr Muir-Mackenzie.)—Would the people take water in ordinary years?—Yes. They consent to take the water in ordinary years. In this delta, even now they take water in ordinary years from the first section of the Gokak

- 37. (1) The approximate minual rent per acre of an irrigated area for good land assessed at Rs. 1-8 is Re. 8 to 10 (double to treble the unirrigated rates). For middle class land assessed at annas 8 to rupee 1, it is Re 5 to 6.
- (2) Formerly in the original survey a higher rate was assessed in consideration of water advantage than now in the revision assessment. In the revision survey, however, the large cost of cultivation being considered, the advantage was lost eight of and the assessment is reduced. The rates are paid on the total area cammanded.
- 33. Not in the Madalgi eide (north). In the other tracts difficulties are encountered. Water-tollers are consulted by rayats in order to select the sito for a well.
- (2) Not in the Madalgi Circle. In the black soil and sandy soil tracts, sometimes foundation is not secared and the device resorted to in such cases, is to base the saperstractures on lags of Pahal-wood. If this is not the case, there is the hard granite or sand-stone, to deal with which the exca-

ration becomes very expensive.

None. The raysts themselves have laken to making borings by means of crowbars 30 to 35 feet in length with great encess in the mardi tract. Water sponts are had in such borings, saving thereby the expense of additional oxera-

39. I um respectfully of opinian that in the arid eastern tract the damming of nallahs passing through their field can be done by only rich capitalists who are very rare. Men of ordinary means will not hazard their capital. In alen of ordinary means will not hazard their capital. In cases where the nallabs are public property, complaints are likely to arise from the neighbouring occupants, and the cost is also heavy. Government alone can do the work and charge water rate on those who are henefitted.

As regards construction of wells by Government it is recammended that Government must set an example by excavation in the castern arid tract, one or two wells for trial. The points to be made clear are:—

(a) Whether sub-soil water can be bad by boring. If so, whether near enough to the surface to make it profitable to draw it by means of buckets for irrigation'

Tes. Tomporary wells and water lifts are constructed on the bank of nallahs and rivers, monly used.

Are temporary wells commonly used.

on the bank of nallahs and rivers, more especially in times of drought. They are a protection for eattle by growing folder and also to men by growing vegetable and cereals. Tagai is given for this purpose and is largely availed of in years of distress, that is sufficient, I

The total number of wells and budkis in the talaka are

	Villages.	. Wells.	Budkis.	Total.
Mamdapur Division	19	196	32	228
Aukalgi "	26	147	111	258
Yndwnd ,, .	39	492	88	570
Mudalgi , .	36	867	66	933
TOTAL .	120 -	1,692	297	1,989

- 8. Q. Perhaps they would not take it in the richer land ?—I believe they would take it on ull lands.
- 9. Q. (The President.)—You say, the "following obstacles to the extension of irrigation in the Gokak Canal nrise—(1) there is not a sufficient supply of cattle which are required for the supply of maunre. The rayats are unable to keep large stocks on account of the want of means and fodder." Do they use artificial manner, fish or oil-cake f.—Only cow-dung and asbes.
- 10. Q. Why not, don't they know the value of it?— Perhaps, they do not use it because it costs a good deal.
- 11. Q. We found in other districts that artificial manure was used, and that the people bring up fish manure from the sea-side. Don't they do that here?—The people who da that must be large land owaers. Here there are only small land-owners.
- 12. Q. Yon say "nll sorts of soil, commanded by the canal, are suitable to irrigation." The canal does not go, then, through black cotton sail?—Yes, there is a small arm of black cotton soil, but it is not very deep and is sited to the irrigation of wheat, "

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- 13. Q. You say "if the reservoir fills, the supply of water available for kharif crops should be commenced any time after the 25th of Mny." Do you think that 15th June is too late?—The people commence sowing the kharif en May 25th, and the water should commence from then.
- 14. Q. You say that the rabi crop season commences on 15th October; and suggest that it should be commenced on the 1st. There is plonty of water in October. Why do they not commence irrigation on 1st October; why does the irrigation officer not grant them permission earlier?—I dea't know.
- 15 Q. De the people complain about having to apply for permission?—Yes.
- 16. Q. Would the abolition of applications be popular?
- 17. Q. Do you think it pessible to remove the applications? It would be better: a uniform rute could then be charged.
- 18. Q. What is the edvantage of the application systems when there is plonty of water f—The canal officer wants to knew who takes water and who does not.
- 19. Q. You say, "on account of drought, agriculturists and agricultural labourers have come to canal villages, and taken to cahivation" and you moutlon only five femilies in one village?—Five new families have settled in one of the 15 villages in the commanded area. [These were the names available at hand. My enquiry since I gave ovidence shows that nearty 100 (one handred) now familles have settled in the 15 villages. They are from the neighboaring villages of the Gokak and also of Chikodi Taluka. The population of the canal viltages has also considerably increased while that of the remainder of the taluka has mach decreased. Mny 1902.]
- 20. Q. Yoa say," section No. 107 of the Land Rovenue Code guarantees against the enhancement of assessment in the case where improvements to the land lave been carried out by the land-owner." Is this prevision of the law generally knewn?—I think the people generally knew this.
- 21. Q. You say that the "private expenditure to bring water to a field depends on the distance from the canal, to which the branch is taken, and is about 4 natures for a hundred running feet "?—Yes.
- 22. Q. How do they settle about taking the water-course across nucther man's field ?—It is generally taken through the boundary between the two lands.
- 23. Q. tion't the people between the canal and the field ever steal the water r-Yes, they steal it sometimes.
- 24. Q. You say "I consider it advisable to encourage and assist the construction by private persons and I manulars of causes of this cort." Has any application even been made by the peeple to build private causes? Four or five applications have been unde. Up to its. 1,000, I cm deal with the application. Above that it has to go to the Collector.
- 25. Q. How about the work F—They want to do it themselvos. The difficulty is that some nallahs do not cass through their own fields, and the difficulty of proprietors they arises.
- 26. Q. Are there many such cases?—No, only fow. I have been encouraging the people to construct such evalla and reservoirs to heard up rain water running down by nallahs.
- 27. Q. You seem to think that it is better than sinking wells !—Yes, but those canals do not run long after the mousoon !—The canals would run till the 15th February.
- 28. Q. How? By bunding up the nallahannd making it into a tank; otherwise the water runs away in half an hour.
- 29. Q. You say that you can hold water in these channels to 16th February; but in a well, would you not count on water all the year round?—Since the list famine, two-thirds of the wells fail, one-third or n little more are completely dry soon after 16th February.
- 30. Q. But in ordinary years, the causls would fail, and the wells would not ?— In ordinary years neither the casals nor the wells would fail.
- 31. Q. You say in paragraph 4 of your memorandam that "formerly the water-rate was low; but that it was gradually enhanced, until canal irrigation was much less availed of." Do you think that the rates are too high?—No; the water-rates are not too high to prevent irrigation.

- 32. Q. But so high that the peopls will not irrigate as freely as they might otherwise do?—The irrigators complain of the increased rates for kharif—juari. They were originally 4 onnas per acre; but are now Re. I per acre.
- 33. Q. Is Re. 1 generally the rate bore P—Yes, there is a great demand for water for kharif on the Gokak Canat, and the people think Re. 1 too high. For the kharif oren, I think it might be reduced. I think if the rates were lowered, there would be great carcase in the area irrigated.
- 34. Q. Do they not irrigate all that they can now ?-No, the whole of the inigable area is not irrigated.
- 35. Q. They do as much as they can P-Ycs; if the rate is redeced, they would be able to buy manurs to enrich the soil to grow better erope.
- 36. Q. What is n her?—It is a measure used here. It is the equivalent of 160 seers of grain.

(I Secr=80 tolas by measurs.

1 Seer= 75-76 tolas by weight end good quality 80 or 81.

#### 1 Scor=about 2 lb.)

- 37. Q. You say that, even if a man irrightes less than an ocre, he has to pay for a full acre?—There is a maximum fixed, and he is charged that rate, even if he irrightes less than an acre.
- Mr. Beale explained that this rule applied to low class orops.
- 38. Q. (Mr. Hiyham.)—Whot is n guntha?—33 feet × 33 feet, 30th of an asic.
- 39. Q. Do the people as manner for everything they irrigate ?-Yes.
  - 40. Q Even mosu-oon irrigation ?-Yes.
- 41. Q. What manures do they use ?-Cow-dung, ashes and sheep folding.
- 12. Q. What does it oost per acre?-Ropec 1 an aero on an average.
- 43. Q. Would they have to pay more per acre, for more valuable crops ?—Yes, for richer crops they have got to spead more. As much as 25 rupees are spent on monure for sugarcanc.
- 41. Q. (Mr. Rajaratna Mdlr.)—As rogards the period fixed for applications, do you think that the dates are fixed so as to prevent the necessity of double charges?—The date it fixed in order that the applications should be presented. Is is also used as a guide for the people to know that after that, water will not be given without double rates.
- 45. Q. Would you suggest that the applications be abolished?—I think abolition would be better; but extension of thee is certainly necessary.
- 46. Q. Yon say that the water-rate for juari is Re. 1 per nero. Is that for a single watering or for the whole crop ?—A single watering is taken.
- 47. Q. If the crop fails remission is granted. Is that guarantee not sufficient to encourage the rayats to irrigate ?—No, it does not cover their losses.
- 48. Q. What proportion of juari is dependent on rain and on canal?—In ordinary years, they do not grow juari by cauel water. Better crops are produced by rainfall; if the raynte see that the rain is going to fall, they go to the canal. They take canal water to supplement the rain sometimes, and in the Gokak Taluka, where rain is very seldom someonable, canal water is usually naked for.
- 49. Q. Anothero sufficient grounds for complaint regarding the water-rate?—The land assessment is 8 to 12 annas an acre, and the water-rate, proportionately, is too high; it should be 8 annes.
- 50. Q. If it was reduced, would there be n large extension of aren?—Yes, specially for kharif.
- 51. Q. How much ?-t think the area would be doubled, and there would be no fall in the revenue.
  - 52. Q. Consequently n larger area would be protected ?-
- 53. Q. Yon speak of the water-supply failing. For how many months does it full?—From 16th December to 15th June, when the supply is most valuable.
- 54. Q. Could not the rayats sink wells to supplement the caugh ?—Wells could be snuk; but, if the rayats do it, I think only half rates should be charged for irrigation by caual supplemented by well irrigation.
- 55. Q. Suppose if well water was used for trigation, and no rate was charged, would that be a good thing?

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- Mr. Beale explained that water-rate was charged, if the well, tank, or Badki was within 200 yards of a Government water-course.
- 56. Q. You say that the rates are high for gorden erops. If they were made half, would that be high?—I don't think so. I think the people should he oncoaraged hy making the rate very low. When the Gokek Canal was first started no water-rate was charged at nil.
- 57. Q. Suppose exemption is gueranteed for five years, would the number of Budkis increase f-Yos, I think so.
- 58. Q. Suppose the system of implication is abolished, could the kulkarnis mensure up the men irrigated?—The present establishment is not sufficient for the Revenus anthorities to take over the measurements. Besides that the kulkarni is not trained as a sorveyor.
- 59. Q. The total irrigated aree of your district is only 6,000 mores for fifteen villages, would not the present staff be able to measure that?—An additional circle inspector on Rs. 25 would be required.
- [Mr. Muir-Mackenzie exploined that the villago accountants at present were not able to measure or servey; but thet they are being taught, and, after this is done, they might he so employed.]
- 60 Q. Could they not meesure by meens of a long pole. In the Central Provinces they do it ?—I do not think so.
- 61. Q. You say that upplications for the coastruction of bandharas have been received. What concessions are allowed in such cases ?—There will be no enhancement at the next revision of cettlement.

- 62. Q. Are they liable to be charged water-rate ?- Na.
- 63. Q. (Mr. Muir-Mackenzic.)—Have you inspected any takavi works?—Yes, mony.
- 64. Q. Do you think that the monoy has been foithfully spent?—No.
- 65. Q. How much has been spent an works, about half? -On an nverage, half.
- 66. Q. Where has the rest of the monoy gonc?—The odynness have been made in famine times for wells and tals—75 per ceat. for wells and the rest for tals, and a good deal has been epent on subsistence.
- 67. Q. In the case of welle P—About three-fourths was properly spent, and there are also eases in which people have spent mecory out of their own pockets.
- 68. Q. But as regords the rooting ap of weede and tels they only spent about half?—Even lees may have been spent in rooting up nath grass, we connot check the quontity.
- 69. Q. In accord to tals, there would not be that diffi-oolty P—No, we can meneure up the work. 70. Q. In the case of tals, they speat half the advance they received P—Yes.
- 71. Q Could you force them in spend the whole ?—I am donhtful whether we could make them spend the recominder now.
  - 72. Q. It is not difficult in ordinary years ?-No.
- 78. Q Does the 50 per cent. include the value of the labour of the rayat and his family ?-Yes.

WITNESS No. 81-Ma. J. E. WHITING, M.I.C.E., Chief Engineer, Public Works Department (refired).

Memo, by Witness.

Mr. J. E. Whiting. 10 Jan. 02.

In seeking to facilitate to the atmost the use of irriga In seeking to facilitate to the atmost the use of irriga-tion in order to alleviate funine in years of seanty rainfall (not of absolute drought), it will be necessary to consider systematically the varying of irrumstances of localities and to choose the system of irrigation that will there benefit the greater number of the inhabitants. In some districts two or more systems may be worked together; but generally it will be found that these would elash more or less, and thet it will be advisable to favour one system. it will be advisable to favour one system.

- 2. The systems may be classed under the following houds :-
  - 1st .- Irrigation by cannle from largo reservoirs.
  - 2nd.—Ditto by canols from large livers having perential flow.
  - 3rd.—From bandbaras on nallahs and streems with porcanial or cold weather flow.
  - 4th -- Irrigation by a series of controlled inondations? spreading over lungo tracts of nearly level lund as in parts of Kathiewar.
  - 5th.-From a series of weire or bandharas along torrents and eleep tribotary streams; channels from these to a screee of field tanks, or 'pockots,' heing out on one or both banks for the water brought down by every shower, that causes a run-off, or fresbet, from the catchment above cach weir.
  - 6th.-From wells.
- 6th.—From wells.

  3. Irrigation projects under the first two systems named above are manifestly the first that will be sought for and must be placed (like Railways) under professional Engineers both for construction and maintenance, but not necessarily for administration. At present it seems os if most of the professional skill available could be advantageously coupleyed in seeking for new sites and framing and executing economical and offective designs for storing and militizing (with a view to the special objects under consideration) weter that now rams to waste, and this not only for the large works coming under the first two heads, but also those under the lird and 4th, and, as will be shown further on, by initiating and guiding irrigation under beads 5 and 6. In fact it is chiefly under these last two heads that extensive improvement seems feasible. That is say to, whon all has been deno that can be dono mader systems 1, 2, 3 and 4, there will be left by for the larger area of this Presidency (excluding Sind) dependent on direct rainfall. If system No. 5 can be extensively inaugmented and No. 6 radically improved and extended, it is believed that a very large amount of what may be termed "ouxillary "rrigation of districts in years of ecanty rainfall can be effected by the

ngency of the people thomselvos, with due guidance and help at first from professional Engineers.

- 4. It will no doubt be noticed that there is no nevelty in soggesting irrigation from a series of woise or bandhuras along torrents and tributary streums, and thot if these were of much use, the people would have edopted them much more than they have done. Gronting all thus, it is the more important to explain why this is so and to suggest
  - 5. The reasons are probably .-
    - The reasons are probably.—

      1st.—Becenso generally these works have been tried for direct irrigation and have been found to supply water just when the people do not want and cannot utilize it, namely, during, or immediately after, each of the heavy showers that bring down the nallahe; that is to say, just when the fields are well scaked by the rain itself.

      2nd.—The narrow nallahs, snitable for these works, here after head to form good storage tender and

too steep beds to form good storogs tenks and the flow in them ceoses some after the rain itself

- 3rd.—The people would hesitate to co-operate to con-struct a good boud and channels large enough to lead the water available to a saties of tanks comlend the water available to a sailes of tanks com-manding their re-pective farms and so that they could be filled in succession and for use after-some days, because they fear that the water will not be fairly distributed. That the first tank of the sailes will be filled first, then if the flow continues, the second and so on. It will not setisfy them to arrange that at subsequent floods the distribution shall commence at the one proviously disappointed; for there mey be but one flood; or perhaps not sufficient floods and one flood; or perhaps not sufficient floeds and they may not come equally ecasonably. What is wanted is the cortainty that the owner of each tank below the channel shall receive his due proportion of each flood. It is believed that this con be guaranteed by a simple and notematic arrangement.
- 10. These works will need to be professionally designed and constructed with good, though not expensive, materials, put together by the people themselves. No patteries will be required and repairs will be simple and can be done by the raysts, who have paid for each work. Recorde of the lovels of the create and details of the arrangements should be recorded in an Engineer's office; so that any modifications that no found desirable, for that the villogers lower down ask for, can be considered by the proper enthorities. proper enthorities.

11. As to the field tanks, these will doubtless leak at first and may eventually silt up; but still the people will be well repaid if they obtain one or two good waterings after each replenishment. Tanks can be cleared out by famine labour and the silt will be ascful on the fields. Absorption is the bods of the tanks will either replenish the springs of wells, or pass into the nollah and so be of use at weirs lower down. Probably if this system be adopted generally, a great improvement in the supply to present wells may be anticipated and a larger number may be sunk. Also the dry weather flow in the main rivers will be sensibly augmented, so that the incidental effects of this system will extend to cystems 1, 2, and 3 situated further down; but possibly this system will olach with those others in years of scanty fall—along catchments, for instance, from which works on systems 1, 2, and 3 draw their supply and which are barely sufficient new, it is doubtful whether No. 5 chendl be onecouraged; especially as there is so much of this Presidency, that can nover be served by large irrigation works, there is ample, scope for system No. 5 without risking interference; but, on the other hand, there are some good sites for large reservoirs, which at present seem barred on account of the unmanagable size of their gathering grounds, the floods from which cannot be dealt with under present conditions, if these catchment areas cru all be furnished with bandhura works and moderating field tanks along the tributary nallalis, (tovornment may find it safe to sanotion construction of these important slorage reservoirs on the main rivers hereafter.

12. The general method of automatic distribution into field tanks that has been proposed for bandharas on nallahs may possibly he adopted for distribution from irrigotion tanals or rather from sids channels to each village below it, so that the canal authorities would need only to periodically discharge into those channels the succified amount of water required to irrigate all the lands, for which applications have been sanctioned there. This water would pass out into distributing tanks commanding those fields as in system No. 5 and be used by the people at their convenience. In this way the services of patheries could be dispensed with and all matters of dispute regarding rottion of supply, etc., to the properties noder each tank, could be sottled by panchayats. There would be some loss by absorption at those tanks, but less extravagance in the fields to better advantage for all parties. This might simplify canal administration and make irrigation popular and effective, and so justify expenditure on large irrigation morks, that would less on the number of people requiring help in times of scanty fall.

13. The system No. 5 has been described above with reference to eases in which it could be carried out by the people themselves, but it is applicable to lorger rivers that have a prolonged flow after storms and a continuous flow after the monsoon; rivers in fact thut would require museum; woirs and be worked noder class 3 but that their cold wenther discharge would not irrigate enough land to repay the cost of the works; if, however, numerous field tanks wore constructed below cannls from these woirs, their ntillty after every freshet would make them amply commentive; in this way system No. 5 may blond with and promote irrigation under system No. 3. The weirs, if provided with ample undersluicing arrangements, may have bridges over them and thus become doubly useful; for dotails see report on such works in Cutch State. Appendix

14. With reference to irrigation from wells it is believed that in districts now protected by canals the existing wells are allowed to go out of use, because of the greater cost of working them as compared with flow irrigation; and this even where the levels of water surface in these wells have her mised by percolation from the canals. In fact the garden lands that have been prepared for reli irrigation are often the first to utilize the canal and are encouraged to do so as an example to others by the administrators of the canals. This is all very well so long as there is a surplus of water available, but when fullure of rain course every drop would be valuable elsewhere, and then it is difficult to induce the rayats to resume well irrigation. It may be found desirable gradually to restrict, for garden land at all events, the grant of canal water to lands that cannot be irrigated from wells; so as to utilize not only original springs, but sub-roll water due to percolation from causals and tracks. The levels of water in mells bricey prejected canals have, it is believed, been recorded with a view to claiming for the canals whatever improvement may arise after admission of the supply; but the results are, of course, not conclusive in cases where the wells have been abandoned, as described above; for naturally, the surface in such would

new rise bigber than when they used to be drawn dry, or nearly dry, daily. If well irrigation can be encouraged, not only will more canal water be available for other land, but probably wnter-logging and the consequent tendency of springs to bring 'Rey' or 'Khar' efflerescenes to the surface may be reduced; for so long as drainage is downwards this does not appear; therefore by keeping a constant draft on springs to wells natural drainage will proceed. It seems therefore desirable to make the people understand that the canal authorities will never charge for sub-soil water even if proved to come from their works. This assarance, tegether with some restriction as to supply of canal water, where wells exist, or can be successfully snak, would probably save a lorge amount of sub-soil water from passing away into nellahs or exading through salt ladon strata to be experted on the soil; how longs the quantity must be, may be estimated from the percentage of loss by percolation in eacals of this Presidency.

15. In the present methods of drawing water from wells there is an unnecessary loss of efficiency through friction at the wooden axies of the wheels; this could be obviated by the use of irus axies on relief or ball bearings, or even on hease. If a few improved but simple appaintus were provided, or lent, for illustration by Executive Engineers on each large work, where the resumption, or increases of well irrigation is desirable, the people might adopt the idea. They might not take up a now pattern, but some simple and easily upplied improvement of their present mots, or Persian wheels would have some chance of adoption. Such improvements would have some chance of adoption. Such improvements would be especially appreciated when ease in Kathiawar and Gujarat lately. The cattle could be sent away to State grazing lands and a number of persons employed and fed in their place, with much better results than are possible with the present westeful machiaery. There are many wells that are not used, because their owners have become poor, or have lost their own hallecks, but oan him some for ploughing their fields. These could be irrigoted by good and light Persian wheels worked by hand power; which would be mest plentiful, when most required, namely, in famine yeers. These abandoned wells mud such us will doubtless be constructed, (when the supply to springs all over the country is anguanted through a general adoption of system No. 5) will not only increase irrigation, but supply preductive employment, conveniently contered, in time of disleases. It may be incidentally noted that, hereafter the neighbourhood of wells need not be unhealthy for relief eaups, if the simple methods proposed for destroying the larve of mosquitos, that breed in wells and tanks, be adopted; also, that when the amount of subsell water has been increased, the position of Springs should be sought and located by horings, so that the construction of new wells may be undertaken us productive relief work.

10. Works on systems No 3 can be constructed with advantage on good sites on rivers below morks on systems Nos. I and 5, although those sites may have been abandoued after systematic gauging of the perennial flow over them in former yours; because they can now utilize in addition the leakage mid waste water from the systems higher ap; while, on the other hand, the construction of these weirs lower down may given great value to sites for reservoirs that have been rejected, though otherwise suitable for relief work, by supplementing the apparently limited ecope of their stillty.

17. There are some sites available for execulout storage reservoirs, that are rejected, because their catchment basins are not of sufficient area to ensure full replenishment every year; and others that would require the run-oil due to two or even more average monsonus to full them; they are rejected, though this average run-oil might suffice, if they were once filled, for enumal local requirements and to make up annual losses due to exaporation and absorption. That is to say, when once filled they might be relied upon, even after a scanty monsoon, to retain an invaluable supply gathered in provious years for the enhanced requirements of a bad year—for instance, they would then serve to irrigate fodder crops and grazing lands for unemployed plough eattle. If these serious periodical domands be considered, it should in some cases outwistly objections that are put furward og first taking up land for reservoirs larger thm would suffire for ordinary local requirements. (For an instance see appendix No. 3)

18 As to the absorption of water on irrigation works it has been noted above that this nater should be utilized at wells and weirs lower down; and with regard to evaporation, which seems to cause a duly loss of about 1,000,000, cubic feet per aquare mile of reservoir surface, it may be noticed that, although not under control, yet it is not all wasted but

Mr. J. R. Whiting.

Mr. J. E. Whiting.

drank is as vapour by leaves of trees, or as dew by crops in the dry weather. Furthermore it cools the air and thos probably determines and increase rainfull.

19. It may be noted that although a year of actend drought all over a district seems to be unknown, and though the detention and utilization of the rain that does fall in ecanty years is what has been the basis of the foregoing suggestions, yet that in some districts the total fall in one yeor has been known to be so very small that great distress would have been felt in those districts even if all possible advantage of rain, nallohs and wells had been taken; these areas, too, may in futers years be even larger. These considerations should catweigh objections that exist to building as many and as large reservoirs as possible wherever beavy rain can be relied upon periodically to fill them, say once in 9 or 10 years; for such reserve tanks seem to be the only recourse against extensive periodical failures. A common objection against proposal to provide larger storage than would suffice to hold the minimum or at the outcide the average run-off (exclading failures) from any eathment mea, is that it would be unwise to encourage the rays to irrigate oreas larger than can be watered from the reservoir thus designed, every year; but, unfortunately, as things stand now, disappointment does occur in years of ocanty rainfall, and it is this that gives the opponents of irrigation as strong point, for it enables them to essert that irrigation doss least good just when and where most wanted; hat this drawback, due to disappointed confidence in the casale to supply their accustoned water, would cause if storage were provided for the water that now runs to waste la good years, and which should be detained not only to use with fodder orops and for the nausal requirements of famino years, but especially to support the credit of the average annual sanctions of water and thas obviate partial insporerlshment of those who strive to avail themselves of irrigation works to the utmost. It is not hero niged that any bear provided, but that those now generally granted may been provided, but that those now generally granted fairly be deh

plenty.

20. The ense of Maswad tank may be qooted to illnotrate the foregoing countle. The entendent area of this tank is so large that in ordinary years the reservoir is very soon filled and much water then runs over the waste weir, but in scarty years it fails to fill. So that the usual arrangements, which the cultivators may have made for wet farming, such as preparing fields, planting engancene cuttings, purchasing seed for garden crops and perhaps extra cattle, as well as mising leans for extended operations hased on the oredit of success in former years, all these brenk down when the tank does not fill; for then the Excentive Engineer has to refuse mony petitions for water, and this, too, in a year when their monson crops have failed! Thus the rayals who lare gene in for irrigation and had good prospects suffer more than others. Such coses, of course, tend to destroy confidence in irrigation projects, as regards protection in times of dronght, except where the tanks have unfailing ghat catchments; whereas, if the second tank that has been proposed were concracted with, say 140 equaro miles out of this enormous entchment, and to hold, say 3,000,000,000 cubic feet, and although it might take two or three years to accumulate this reserve (for wheaver Muswad tank did not quite fill, water would be let down from the new tank to make up the deficiency) yet it would rejusting the credit of that work with the people. The supplementing water would not he let down until all chauce of natural replenishment had cessed, so, that no available storage room might be wasted. The difficiency in Maswad might at the end of a bad monsoon appear greater, because the ran-off from those 140 square miles had been intorcepted, but the water would he available and it is manifestly waser to store it in the apper basin till the end of the monsoon, as explained above. But so soon as Maswad tank has heen assisted to its full supply level, a portion of the remnuing resure in the apper hasia could be devoted to allevinting diotress, who

able. It appears the a that with 'sufficient reserve eterage irrigation system in districts with ramfalls that are periodically good, can be trusted to alleviate distress: but that without it they tend to aggravate it.

eolly good, can be trusted to alleviate distress: but that without it they tend to nggravate it.

21. The case of Ekroek tank is one in which surplus storage has (though unintentionally) been provided: for along the Adeln river, only a small proportion of the available ran-off is asked for in ordinary years, while in had years, when the consumption is great the tank does not refill, but depends on the reserve oterage which then becomes of inestimable value, not only for crops and drinking water, but by the maintenance of wells which probably owe their efficiency to percelation from Ekroek tank and its canals. If, then, tanks can be provided in any district subject to occasional drangbt, they should be designed to bold of least double the water that woold be provided by present roles. In short, the provision of reserve storage appears to he the solution of the problom, as regards system No. 1, with reference to the present inquiry; for, as indicated in appendix No. 3, such ottra storage woold be coostructed by available relief laboor, and it is better to convert even good lands into reserve lakee with frieges of pasture, etc., that will preserve life in future dronghts, thus bliadly to devute these sites to remain as annestics for excess population that must migrate, or starve, when the periodic failares of rain recur. But there are many busins with inferior sails that could be dammed up and be utilized for reserve storage; and these basins are situated well inland, where the worst effects of droughts occur and where percelation into wells and any effect towards establishment of rain currents would be invalable. On the other hand, there are still a few sites for reservoirs in the Western Ghats mutilized. These would, of course, fill yearly and be very useful to the tracts they command; but being of masenry, they would be fur more expensive and would not supply so snitable labour for relief gaogs as the earthwork dams odvocated above in the centre of famine districts; nor would an increase of rain, if induced by

22. With reference to system No. 4, the chief points to be noted seem to bo: -

1et.—That although g reatly desired yet these inundations at present do often as much barm as good.

2nd.—That appareatly slight re-armagements of the conditions in each case can secure more general beachts; bat to effect this, systematic direction and co-operation of all parties is required.

While it is difficult to give general rules for these irrigation works, it may be noted that in each district the rayats know prelty well what is wnated, but a few interested parties obstruet operations, or will not pay their proper share of expenditure; vbcreas it they wore designed and laid out beforehand, these works would afford excellent labour for relief gange in time of drought and the cost need theu not bear nudnly on any one. It may probably be the simplest way, to quote an actoal case, where professional advice was called in to draw up such a scheme.

See appendix No. 4.

23. The rise of sndden floods in Gujarat and parts of Knthiawar with apparently less raiofall, than would cause a similar run-off in other districts, is due partly. to the omallaces of the general slope, but probably also to some conditions of absorption that are not clearly understood, and it seems likely that the sinking of wells, or otherwise providing inlets for water and caulets for air, might mitigate those floods and tend to retain for use in the sub-soils, much of the water that now passes away in floods; but it would be necessary, then to pass off by ohmnels the brackish water that would at first be found. At precent there is little or no circulation of this kind, and wells are not the assistance they might be in times of drought.

24. Next to water itself silt is the most important feature in irrigation projects, and constitutes the greatest dishculty in the way of their continued success. It goes without saying that the rate of annoal deposition of silt in a reservoir is the measure of its life and that therefore as little silt as possible should be allowed to settle yearly in a reservoir; and as the first annual fineds bring down the greatest quantity, it may be set down that every tank intended for irrigation porposes should have a catchment area so large, that these first floods may be safely allowed to pass out through underslaices; but this water should be held up by a, weir bolow the buad, and to such a depth that the silt may divide itself into clayer soil in suppension and sand and pebbles in motion along, or user the bottom and passing away through

openings thero, while the upper and cloyey water should be turned into canals filled to over-flowing and distributing the fertilizing matter on the fields, or into numerons field tanks, as described for system No. 5. It has been objected that if this system be adopted there may coensionally be a failure of the mensoon after those first silty floods have been thus dealt with; but if large reserve reservoirs be constructed with comparatively small catchinent areas on tributary branches, and if these be kept constantly full, the danger just referred to will be greatly reduced; for if the lower tank he not repleuished by the end of the rains, water can be let down from the reserve tank. That the upper tank will is time silt ap, must be conceded; but as its catchment may be small and its capacity so lurge, that it may take two or three seasous to fill it, the annual dopth of doposition will be small and therefore its duration as great, that it may be fairly expected some remody to this silting difficulty will be discovered before the reserve tank's ntility is seriously impaired. The construction of terraces for catching silt along the sides of the gathering area, for instance, or the erection of an alternative reserve on some other feeder, whose catchinent basin has been already terraced, may be considered.

25. The necessity for holding back water for use in scanly

25. The necessity for holding back water for use in scanly years and specially by the construction of innumeroble puddled trenches across the beds of nallahs in system No. 5 may seem opposed to accepted ideas about drainage, bat it is probable that in some parts of the country drainage has been carried to excess and that a failure of wells has resulted. If a foot or so of top soil be kept fairly dry, and if a better circulation of sub-soil water is kept up by an extended draft on wells, it is probable that the country will not be roudered unhealthy by a general holding up in every possible way, the woter that is now not only allowed to run to waste, but occouraged to do so. Modern researches seem to show that malaria does not come up out of wot ground, as formerly believed, and, if this be correct, a great difficulty in the way of increasing the amount of water available under ground, for use in years of scanty full, has been removed.

26. While it has been noted that at times of scarcity there will be lubour available (and that must be paid) for the construction of protective works, yet it cannot be doubted that, looking at it in only a money point of view, as much os possible should be done before such times come again, as have lately witnessed the destruction of many lakes af cattle, worth from 100 to 200 rapees a pair, as well as on enormous loss of reveaue, especially in the active states of this Presidency. Those have inaugurated unserous irrigation projects with great zeal, and these are still in progress in Baroda and elsewhere. The loss of revenue due to the past years of scarcity prevents the nettre prosecution of such works in some parts, but it appears unwise to learn the cost of droughts and then to wait for further losses before adopting every sort of irrigation that can be proved to be sound and feasible.

can be proved to be sound and feasible.

27. In canclusion any long rospite, that occurs may well be omployed to test on a practical scale such of the aumorons suggestions, as will have been put before the Indian Irrigation Commission from every direction and that may be deemed worthy of trial. Also, it may possibly be proved, one way or the other, whether wet cultivation and forests and large-surfaces of water do tead to produce an improved rain habit; but at all events, it should be seen before the next series of famine years is due, whether irrigation on an extended scale may be trusted to protect India from their ravages. So that, if not, the people may be warned in omple time not to multiply as heretofore in a fool's paradise, but assisted to emigrate to where periodical failures do not occar and where their labour will never be subject to payment at relief rates.

#### APPENDIX 2.

Suggestious regarding the utilisation of the flow in Rivers in Cutch during the monsoon, sent to the Cutch Durbar, 9th February 1:01.

If I am not mistaken, there is a great amount of fairly good, though saudy and light, seil in the territory of His Highness the Rao Sahib of Cuteh, which frequently lies fallow, or yields a meagre orop, because the full and seasonable rejus have not been received. Also it appears their there is seldem so much min, that a few extra waterings or even extra seakings (instead of mere sprinklings due to natural showers) would do danage, such as similar treetment has been found to cause in parts of Gajarat and the Decean where the average rainfall is more copious and where the sell is black and heavy.

2. If this be the case, the construction of comparatively small storage reservoirs or regulating basics, as they might

bo called, from which canals might water the fields, whenever there was a freshet in the river, would be of great use. The bund, or weir, being merely high enough to store safficient water to spread the supply over two or three days. If the peeple would make small tanks in good positions at a little dislance from the river, that could be filled, one after the other, from the main bund and its canal, they could let the water ont of these on to their crops subsequently and as required. Those bunds might be replenished at every fall and used to complete the waterings commeaced by the rain on their adjacent fields. In some places larger reservoirs with high dams could be constructed, that would yield a supply for the cold weather; but these would be for more expensive and difficult to construct and would generally be placed well ap in the hills; while the weirs and small hunds referred to above, might be built oil cloug banks of the river helow the site of the reservoir. The woirs would be useful in distributing by canals on each back not only the freshrts but also the natural rabi flow in the river and the supplies that would be let down from the upper reservoirs or regulating bosins. If these basius be constructed the observed.

8. Unless weirs in Cutch rivers are to be utilized for mensoon waterings, as well as for rabi orops, it does not appear that the untural flow in any of these rivots during the dry weather, will, when led out of the rivers by means of weirs with suitable head works and canals, poyn fair return on the outlay that would be incurred in building the woirs and forming the canals and looking after the irigation.

woirs and forming the canals and looking after the irrigation.

4. For instance, taking the ease of the broken weir on the Pur rivor, the longth of it is obout \$20 feet; its average height 25 feet and its mean thickness 6 feet, the mean eross scotion having an area of 400 square feet; taking the cost of the work at 25 rapees per 100 subic feet, the price would be 100 rapees per foot forward of the weir; or for \$20 feet, Rs. \$2,000. 'the canal and head works would oest probably Rs. 5,000, more; say at least Rs. \$7,000 this at 4 per cent. would cost Rs. 1,4.0 for interest per annum but this is only a first rough approximation to show that, the rabi flow alone won't pay the cost. Foundations and underslabing arrangements will be expensive and must be carefully estimated. The design of the prosent broken weir is very faulty in every feature and must be romoved, if this site be adopted for a new weir. (A sketch design and estimate is appended.\*)

estimate is appended.")

5. Now the water measured on the 29th January 1901 shows a supply of oix cubic feet per second; at least ind would be lost; leaving, say, four cubic feet; or only sufficient to water about 400 acres of dry crops. Now the rates for these would not be more than Rs. 1,200, leaving a deficit of Rs. 250 for interest alone, but there will be cost of maintenance; but if the canals were also to be utilized for monsoon water, it would show probably a very considerable net revenue, as the site commands o considerable strip of good land on the bright bank.

6. If a storage reservoir or even what may be termed moderating basus can be formed on this river higher up, this weir will prove still mero volumble; or on the other hand it may be found that the land can be commonded by a shorter and obcaper weir bigher up.

7. From inspection of the ground where the Pur river outs through the rocky ridges at the villages of Radhaupur and Traiyu, it seems probable some storage work can be economically formed, and escapes for the surplus water provided at the flanks of the ridges. The catchment area at this site is about 34 square miles. But before final oplaions can be given as to the best locations for the several structures that are possible on this river, complete surveys must be made as well as trial pits sunk to test the seundaces of the foundations and decide the depths to which they must be laid. The racks appear to be in rather thin layers with somewhat pormas materials between thrse. Se that great, deep and wide foundations laid in the best hydraulic lime must be specified, while the junctions of the wills with the banks must be effected with long wing walls united to the rock by concrete filling well reanned as. Cushions of water as they are called on which the floods passing over weirs may have their force broken, must be formed by building subsidiary walls at a little distance below the main ones. Otherwise the bed of the river will be oreded oud the safety of the works ondangered. Nothing but well-designed oud carefully-built weirs will stand on the Par. A drowing for the new weir and specifications will be sout shortly to show the sort of work that is necessary; but it is probable that a nerrower part of the river can be utilized which will

Mr. J. E. Thiting.

Mr. J. R. Whiting,

command more lend. The exact site may be decided when the surveys are ready.

10 Jan. 02.

#### APPENDIX 3.

Extract of a Report made at the request of the Darbar of the Palanpur State.

- 2. On the Knpm river two sites for large earthen dams were found, one below and the other above the village of Hathidra.
- Hathidra.

  3. Commencing with the lower site, this is situated \$\frac{2}{2}\theta of n unite up the gorgo, whence the Kupra issues from the Hathidra Vulley. It is where a low hill fnees the mountain on the opposite (right) bank of the liver, while the Huthidra read passes between it and the ridge that rises thence to the hills on the left hank. It will be seen from the section that the main gap, which has to be hunded, lies between thet low hill and the opposite mountain. It is to be 1,400 feet long, top width 20; the ground rises rapidly, on both sides from the river: front slope 3 to 1, back 2 to 1.
- 4. There is good stiff olay soil along the section, where trial pits have been small, sod there is an abundance of suitable meterials for construction of the dam in every direction. Good (brick) clay is procurable for the puddle trench and core. Water is plentiful even now on and below the surface of the river for use on the works, and for the people to drink, and there is ahundance of stone for face work on the adjecent hills, and there are said to be lime quarries in the valley.

  5. It is appropried to resent his hand to those feet user the
- be lime quarries in the valley.

  5. It is proposed to raise this band to three feet over the top of the hill, mentioned above, which is 77 feet above the river bed. This will enfice to impound a depth of 78 feet of water (a natural wasto weir, described below fixed this depth.) The gap at the read and another a little forther to the left will also he closed eventually, but will form very convecient ontlete for the water, if it should be necessary to stop the work during the monsoon. The regulating tower and outlet culvert will be placed on this read, or it may be found preferable to bore a tunnel through the low hill itself. In every way the site is a most convenient one for constructional ressons. It remains to describe the proposed lake and the conditions of its replenishment.

  6. Its orea, or water spread, when full, has been approx-
- proposed luke and the conditions of its roplenishment.

  t. Its orea, or water spread, when full, has been approximately estimated at four equore miles, at least. The valley is wide end flat, but the euclosing bills are steep and rocky. The slope of the river bed is 17 feet per mile. The mean depth 'of the reservoir is estimated at 22 feet and ils contents at two thousend five handred millione (2,500,000,000) cubic feet. The eatenment orea is only 15 square miles: so that this design would not be suited for the requirements of an ordinary irrigation work; hut it is very suitable for a protective work to be utilized chiefly in years of drought. The entelment area being so small compared with the contents of the leke, it will probebly take several years to fill it; but when filled, the unnuel replenishment would be lost over the weste woir if not utilized for irrigation. A quantity therefore equal to this may be drawn off for that purpose ununally leaving the rest for famine reserve.

  7. The rainfell at Hathidra has been estimated by the
- 9. \* \* \* \* \* \* \* \* \* \* It will be seen from the foregoing, that 690,000,000 enbic feet of water will be available for irrigation at the end of each ordinary monsoon. This quantity will enflice to irrigate 0,000 acres of ordinary cold weather crops, for which a revonce of Rs. 27,600 may be expected. But when this has been expended the numnal loss by evaporation has occurred in the lake without monsoon repleaishment (i.e., when the monsoon has failed) there will remain etill 1,500,000,000 enbic feet in the lake, which can be utilized for irrigating 15,000 acres of lend, the value of which in each u year cannot be estimated.

### APPENDIX 4.

Notes regarding Limbol rivers and lands 'ying at the north-east of Kathiawar.

- 1. The chief course of prespority and fertility in these districts consists in the annual silt bearing floods; supplemented by local raius; the latter is, of course, essential
- 1. Q. (The President.) You bove had many years' experiences in the Irrigation Department of the Presidency, and letterly you were Chiof Engineer? Yes.

- at euch high-lying parts as cannot be reached by the annual floods.
- 2 These floods appear to pass over most of the country with a depth of fram 2 to 3 feet. In the main nallahs the depth is greater at flood time, but generally only from 2 to 3 feet; these collabs are wide, shallow and very sandy.
- 3. The sub soil consists appurently everywhere of sund, probably sea and; on the a stratum of alluviel soil consisting of sand and cluy and vegetable, detritus hes been deposited through a long series of years. This layer of soil is in a state of unstable equilibrian. It is very ensity disselved and carried away; the floods bring it and if a higher more rapid current passes over any place the soil is wested away.
- 4. The soil consists in most pieces of equal parts of sand and elny; but in some places there are three parts of sand to two parts of elay; and in very peur fields the proportion is even three parts of sand to one of elny: The great object should he to retuin the eley and vegetuhle mould and to keep the sand covered up and and istanced.
- 5. The sand appears to contain salt; and this salt is forced upwards in many places by water from below upparently which brings the salt to the surface and renders the land burron; one of the objects held in view is the provent such upward percolation or to wesh away the selt if over it has been brought to the surface. It epicars that this can be managed.
  - 6. To sum up the chief objects lo be atteined are -
    - (a) To prevent land being cut up and washed away.
    - (b) To utilize and preserve silt (clay) as much us possible and to nucrease the proportion of it to that of sand.
    - (c) To cover up and get rid of us much sund us pessible.
  - (d) To prevent neward percolation of water and sait ellorescence from appearing on the fields.
  - (e) To wush this uway when it does come.
  - (f) To store as much water or possible in saitable tanks und use it for washing salt lend and for rice cultivation.
- eultivation.
  7. In order to earry out these, systematic treatment of the district is desirable so that when good is done to one part injury may not result to another part. Cero must be taken not to overdo improvements. By working all the arrangements systematically, double and troble bonefits will be derived; for instance, if the rapid passage of floods over certain fields be restrained by a number of low parallel banks and on as to held up the flood for a short time, the silt will be deposited on the fields and crosion prevented, but also the clear water should then he led into soitable tanks provided at convenient sites, so that these shall be filled with elear water instead of dirty flood water, which soon chekes up the tunk with eilt. The clear water will then be used to wash salt land.
- B. Again if cuts are made to draw off excessive floods from one district care must be taken that the water is not discharged on to lands already affected with floods. It has been noticed that in some cases this is done and that water coming from a flank, in addition to the former flow across the field, causes the soil to he cut up and destroyed. This uppears to he the causes of vartinjury at Jambu—a new cut is wanted to carry off water that flows from Siani towards Jambu and the extra water in the main river should be provented by a dam from entering the cut up land.
- O. If system be organized and an efficient establishment, works will easily be carried out so as to assist each other. Cultivation is allowed in the hede of large nallahs as at Punsina, but though it is a good thing to utilize sub-seil water for melons, the banks should not he allowed to be constructed across the river bed but parallel to the stream, then obstruction would not be caused in floods.
- . 10. When send is dugout of a cut or chunnel it should ull be deposited where n bank is required for a tank or other work and should be covered up with cley. It is thue got rid of and does good, instead of harm.
- 11. Details of the several channels and works proposed and methods of constructing tanks, waste weirs und outlete will be given hereafter when levels have been taken.

<sup>2.</sup> Q. You designed and carried out the Nira Canal. did you not !- I did.

- 3. Q. We should be glad to get the benefit of your experience. We are much obliged to you for the interesting momentum you have kindly sent in. In the first place you call attention to bandharas or field tanks. What size do you contemplate building these tanks?—According to the size of the fields; and I would build them in such a way that if the field-owners wished to enlarge them, they could do so. Several men might club together and make a tank for themselves. In the north-west corner of Sind, just above Karashi, there are a large number of tanks; people club together and gather into these tanks the water that comes down the nathab. There is a very large tract in Sind which is fertilized from such tanks.
- 4. Q. These tanks would irrigate four or five acres each?
  -Yes, I think so.
- 5. Q. They would not be called upon to hold water for more than a few weeks at a time?—They would give water as soon as the rain had done its work. They would store a supply for two or three weeks.
- 6. Q. Now you say that you would have a system of irrigation "from a series of weirs along torrouts and steep tributary streams." You would have the tanks filled from streams that flow one hundred miles away?-Yes.
- 7. Q. Then you say that " the narrow nollahs snitable for these works have too etc. I beds to form storage tanks. Would you not extend these landharas to rather larger streams?—Yes, they could be extended to the larger streams; but the great inspirity of them would be from the smaller streams, so that the villagers could manage them themselves. selves.
- S. Q. Would you propose that the bandharas should hold up to 3 or 4 feet of water?—I don't think any storage is possible in the natlah it-elf, as the velocity of the water it so greet that the bund will be carried away at once.
- 9. Q. Is the system carried out anywhore in the Deccant I have seen small tanks of this description in the Rooms District, near Porandhar, and in the hills near the Rim. The purpose is to catch the sit, of which they get a nice deposit from the hills. It is a kind of terracing. There is a great deal of it in Parandhar. In every nallah they do it, so catch the silt, brought down by the stream, which haven fortilising. le very fertilising.
- 10. Q. flave you ever tried your automatic system of distribution?—This automatic distribution was proposed by me in a dispute between a Native State and some villegers. It was found to work well.
- 11. Q. Generally speaking, is the silt in the Decean of a very fertilising nature f—Yes; in connection with the Poona unter supply. I suggested that silt beds should be made, so that in the dry weather, when the water got clear, the silt could be put aside and in the monsoon it could be utilized, instead of being carried away. It should be put buck in the monsoon in order to keep the water free from wells. In the Nira the uniter is dark with silt all the way down and there is very little trouble with weeds.
- 12. Q. We have been told by various witnesses as to the en Chats. We have here told by various winesses as to the possibility of storage tanks in the miny zone of the Western Ghats. We have learned of two sites above Lake Fife, and one above Bhatgark in the Nira Volley. Perhaps you can toll us of more?—On the Nira at Bhatgark, two reservoirs might be unde on the Gelavandi and Gaujawin. And there is another site above Bhore.
- 13. Q. Have they been inspected?—The one on the Gunjawin was very carefully surveyed. I had the plans ınade in detail.
- (Mr. Beale explained that these surveys and plans could not be found. He had found some; but they only referred to the survey of the right bank.]
- 11. Q. (Mr. Jibelson.)—I think that all irrigation projects should be printed. We have beard of many such cases as this, in which plans have been less after the expenditure of much time and money?—Mr. Berman did that survey. and the maps were most beautifully traced. He did both banks.
- 16. Q. To go further down, are there any sites for glat ricervoirs in Satara? - In Satara there are several sites non-the railway. These are east of the line. Messis. George and Maclaron surveyed them last year.
- 16. Q. Further north than that?—There was the Karla project on the Krishna; but I believe that has been reject-
- 17. Q. Are there any sites in Kolhapur?—I do not know. 18. Q. You probably know about the Alaladerl and Chankerpur tanke?—No; but there is a site at Raipur,

- which has a catchmont area of 800 square inites It is a good site, and there are two sites above it. I would store water in pockets outside the glasts keeping it, if necessary, for five or six years so as to have it available for a famine year.
- 19. Q. We find that a certain distinction has been drawn 19. Q. We find that a certain distinction has been drawn in the Decean between protective and productive works. The Motha is a productive work, and the Nirs, a protective work. Is there any advantage in the plug up this distinction f—I think that you might treat the supply up to a certain paint as productive, and beyond that as protective, to be utilised only in very dry years. If a work is expected to pay its interest on capital account, it should be worked to pay its interest on capital account, it should be worked to pay its interest on capital account, it should be worked to pay its interest on capital account, it should be worked to pay its interest on capital account, it should be worked. on my the numbers on explain account, it should no worked as a productive work. In Gujarat and Palanpur, they regretted very much not having adopted this principle, as several lakies of cottle, worth Re. 200 and Re. 200 a pair, were lost for want of forlder. If a little water had been stored the cattle could have been saved.
- 30. Q. Would you put any restriction on the rayats growing a certain kind of crop, or would you leave it to thou to learn by experience to do their own distribution?—As long as you can be certain of giving the water, I do not think that restriction is necessary.
- 21. Q. Would there not be a tondency to grow too much angar-cane. On the Mutha we hear that they can commend one hundred to one hundred and fifty ruppes per acre of cane; and that, in consequence, they grow as much as possible. Would there not be that danger here?—They should be taid that they may espect a certain amount of mater; and that they must arrange accordingly.
- 22. Q. We have had a proposition lately that no water should be given for came after a certain date, naless there is water to spare. Do you agree with that?—They might be given water on condition that they should continue the irrigation by wells.
- 23. Q. Would you make the charge smaller on account of this hability ?-Yeu.
- 21. Q. We have had a good deal of discussion on the subject of applications for water. Are they a necessity in your oplaion?—I should like to give the water to a village and let the people distribute it among themselves. At Vir there is a river with a nice supply, and here the people distribute the water by a panchayat and they never have any quarrels.
- 25. Q. From what you saw at Vir, do you think that it would be possible to apportion the water by regulating the size of the outlet according to the area to bu irrigated?—The people would tamper with the outlet. The water should be let into channels, and they should be allowed to take it. in take it.
- 23. Q Do you think that we could make an outlet that they could not tamper with?—Yes, but where you have a putker's there is always favouritism. It would be better to put the water into a tank and Irave It to the villagors to distribute.
- 27. Q. (Mr. Highum) With regard to sites for large reservoirs fed by rainfall from streams and rivers have you mentioned all that accurred to you as feasible athemes? - I had no time to mention all the sites when preparing my
- 28. Q. Then you have examined sites for other truks?— Yes, I examined the Gerha site at Wodaj, south of the Nim Canal. That is a very good site, a weir could be made there. It is an inland pocket, which could be fed by the brigation canal.
- 20. Q. Would that be an unfailing supply? In very but years, it might fail; it is in the Chats where there is a rainfall of 21 85 meles; it would fill in three years out of fire.
- 80. Q. I was thinking of sites that might be depended on annually. Have you seen the Maladeri Tank ?- I have not seen it.
- 31. Q. Are any storage tanks possible on the Godavari ?— There is a site at Raburi in the Ahmedmagar District. It is on the Mulla River. It has 800 square mites of catch-ment. There is some difficulty about the wasto weir, but it is a splengid site.
- 32. Q. (The President.)—We have been fold of another one near Poena on the Koina. And there are proposals, we are told, to make a storage tank in connection with the Godareri at Nasik. Do you know anything of these?-
- 33. Q. (Mr. Higham.)—Do you know of any other sites?—There is a site at the junction of the Mulla, and

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- another above the Khadakwasla Lake. I examined a site near Bhusaval at a place called Raipur for a tank on the Waghar.
- 84. Q. Would it fit!?—It is in a very large catchment area; and there is more water than is wanted. The greater part of the water would run to waste. It requires a large waste weir.
- 36. Q. If you have a large tank, you must have a comparatively large area at your command?—If you nee it as a protective work, a minimum supply of the storage can he used, and the rest kept for use in bad years.
- 36 Q. Do you know of any taak in which a portion of the supply is kept from one year to another?—No, I think you loss nothing by keeping the water. I would make tanks larger than would be filled every year, in order that when you have deficient rainfall the Executive Engueer may have water for the people, who will be disappointed if they do not get water regularly. If they are given water one year and refused the next, the people lose confidence and won't taks water at all.
- 37. Q. Then you recommend two-year tanks?—Yes, I believe in large reservoire. In ordinary years, the orop would be guaranteed, and there would be a supply for fodder for the cattle. I proposed that a second tank above the Mhaswad height be constructed, so that the water in the lower tank should be supplemented, and the supply guaranteed.
- 38. Q. Does Mr. Beals know about that tank? -(Mr. Beals).—There was a proposal for a tenk above the Mhaswad which has been rejected.
- 39. Q. Would you never irrigate from the npper tank?—
  No, I would store it simply to give confidence to the people who irrigate from the lower tank. Some discouragement has been cansed, owing to the supply of the Mhaswad tank having sometimes failed.
- 49. Q. As regards your system of bandharas, you refer to a series of weire from streams that come down spasuudieally for a day or two P—Yes, I refer to streams that come down in short spoyts; they have steep slopes.
- 41. Q. What would you call stsep? -About 17 feet a
- 42. Q. You do not think it would be good for etorage, if it was more than 5 or 6 feet per mile?—Nallahs of steep fall are not good for etorage tanks—6 or 7 feet per mile is the limit.
- 43. Q. Without a storp slope, could not you get a good command?—The bandhurus I speak of are those in which the watershed is quite class. I would have a bandhara and then five or six tanke; then another bandhara, and so on.
- 41. Q. Are there any such works?—No, not in these Provinces, but in Sind they use that system for getting the water ou to their fields.
- 45. Q. Is there not a great difference between the requirements of water in the Decean and in Sind, where one watering will suffice ?—Yes.
- 46. Q When do the basins fill in Sind?—The basins in Sind fill during the flood in the south-west monecon, when water comes down from the Baluchisten hills; it is not then wanted owing to rain.
- 47. Q. What is your idea of the size that these basins should be ?—The basine should be large enough to give two or three waterings. If passible, they should be in two or three different parts of the farm.
- 43. Q. Are there suitable sites in every farm to build two or three of these tanks?—I es, when one is silted up wheat can be grown on it and another used for storage.
- 49. Q Is the country in this part of India as feasible for storage as that in Sind?—I have seen them in Purandhar, but, perhaps, the idea of two or three persons combining would be new to the people in this part of the country.
- 50. Q. You would not make any large tanks to be fed from the nellahs?—In Cutch, near Bhuj, there are places where weirs are made 30 feet high; but the people do not make them now.
- 51. Q. What would be the cost of bringing down enough water to carry the crops through the cold weather?—I don't think that the water will last beyond the mensoon—not generally for the rabi crop.
- 52. Q. Do you contemplate Government building tanks of its own, in addition to the village distribution tanks?—
  I den't think it will pay.
- 58. Q. You would pass the whole of the supply into little basios?—Yes, the weirs will have to be made very carefully.

- 54. Q. Would there be any danger of silt accumulating above the woir?—Yes; but the greater part of the silt will be good. There is not much sand in these nallahs.
- 55. Q. Would you recommend weirs with gatee; would that be an advantage; or would it be an uonecessary expense?—Falling gates would be good, but would be an unnecessary expense on small works. But sinices with wooden needles could be used.
- 56. Q. In the case of farms or villages, where it is not possible to find sites for storage, would you have the water directed into water-courses?—Yss.
- 57. Q. But you don't think that all the fislds will benefit equally ?—Many fields could be served in this manner.
- 58 Q. That would be where the slopes are etecp, more or less on the hills. Do they get famine there?—No, not on hilly lands like Bareda.
- 59. Q. In what district do you contemplate these bandharas?—In the Districts of Satara and Poons, in the Nita Valloy.
- 60. Q. That District is not at all subject to famine f-No, I only name it man case. In Sholapur and Bijapur the people would have prior claim to the submoutane tracts.
- 61. Q (Mr. Ibbetson.)—Would that system be possible in Sholapur and Bijapar?—Yes, I think it could be done, and where the slope is steep, the storage could be obtained in the nallahs.
- 62. Q. (Mr. Higham.)—I nuderstood that you propose the extension of this system even to u canal like the Nira, i.e., to allow each village to have a tank and to fill it nud distributs the water among themselves?—I think the Nira Canal water might be distributed in that manner.
- 63 Q. Practically you would sharge on the number of times the tank is filed?—Yes; you would have to be a little lenient at first, it would save the cost of measurers and other expenses.
- 64. Q. Surely it will be difficult to find sites in that flat country. Do you suppose you could get eites for two or three tanks in each village?—I think there are a great many tank sites to be found. There are tanks in almost every village. In Madias they have thousands of small tanks.
- U5. Q. Where you could not got tanks, you would still have to keep the patkari?—Yes.
- 66. Q. There you could not adopt the system as a whole?-No.
- 67. Q. Then tanks seem to me to be open to three objections: (1) You cannot find sites; (2) they would be expensive; and (3) they are likely to silt up, and now ones would have to be made?—The clearance of the silt of these tanks could be done by famine labour.
- 68. Q. Suppose there was no famine. There would also be less by absorption?—The less by absorption would go into the wells.
- 69. Q. Do you contemplate that these tanks should be made by Government or hy the people themselves?—By the people themselves.
- 70. Q (Mr. Rajaratna Mdlr.)—Where water is not available for tanks, could their place not be taken by outlets and the people allowed to open and shut them themselves?

  —Yes, I think that rould be done.
- 71. Q They could be opened by patkaris on particular days?—Yes. I think that could be done.
- 72. Q. (The President.)—We would be glad to have your advice as regards Kathiawar?—I would like to put in these miditional Memoranda which I have prepared in regard to works in Kathiawar.\*
- 73. Q. Have you had any experience of famine labours --- Yes.
- 74. Q. Could it be esefully employed on these bandhoras? - Such labour can be employed on the earthwork.
- 75. Q. The bands would have to be of masonry?—The bunds would be of earth and pitched; and where the water flows over, there will be longer vertical stores. I bave made such an escape successfully.
- 76. Q. (Mr. Mair-Mackenzie.)—The Nira Canal I managed as a protective work, i.e., the water is conserved for rabi crops. On the Matha, which is a productive work, all the water asked for is given for perennial irrigation? Do

\* Printed ante.

you not think that one system of administration would do P Don't you think we could monogo works like the Nira on the productive principle and give weter ficely far perennial cops if asked to do so P—No, there should always be a

77. Q. Was it at your instance that the Nira was monoged as a protective work ?—I think that it was done at my

78. Q. Are you satisfied that the results have shown the necessity for it ?-- I am very much in favour of storage for famine years.

70. Q. You say you are strongly in favour of extra Mr. J. E. storoga in view of famine. Do you mean you would Whiting, provide storage in excess of the demand, or that having the demand, you would still refuse water with a view to storing 10 Jan. 02. and guerantee weter for that amount always. The remainder I should keep as a reservo.

The President.—We are greatly obliged to you, Mr. Whiting, for the trouble you have taken in proparing your note and for coming here to give evidence.

### THIRTY-FIRST DAY.

Dharwar, 13th January 1902.

WITNESS No. 82,-MR. H. Il. SHIRHATTI, Pensioned Deputy Collector.

Momorondum by Witness.

Dharwar district are:

With regard to the first three tanks I am unoble to give any elaborate description as I have lad very little time at my disposal to make inquiries about the details concerning these tanks, but I can only soy now that these tanks, especially the one at Bladog, have been the source of great help in irrigating a wast area of lands which yield different lates of the source of the s help in irrigating a vast area of lands which yield different kinds of crops, ric., sugarcane, lemons, plantains, coconmuts, vegetables, etc. It is the greatest tank in this district; but I dare say that no tank of such extent and usefulness exlets anywhere in the adjacent parts of the country except in the adjoining Mysere Province. Indeed, this tank, irrigating as it does a large tract of land, holds a great cheek upon the effects of famine, and, if I mistake not, famine does scarcely assume a fearful aspect in the Kod and the other adjoining talukas, as compared with the talukas and districts lying at a distance. I know sometalukas and districts lying at a distance. I know some-thing of the Medleri and Asundi Tauks, because I have served in the Rauchenaur taluka as mandatdar there. served in the Rauchennur taluka as manilatiar there. Both there tanks, though not so extensively irrigating as the Madag Tank, do water a considerable acreege of land and yield crops such as those mentioned for the Aludag Tank, thought to a smaller extent. These tanks do not yield sugarcane on a large scale, but produce plantains, lemons, sweet potatoes, etc., and are therefore of very great use to the people. But I respectfully leg to propose that the irrigation lates may be reduced, as they are higher them the rates at such tanks as Madag and Dambal.

There are a few irrigating wells throughout the district of Dharwar. I may mention one or two such wells in the alundarci letha of this district, where I at present live, viz., the wells at Tambergandi and Ramonolalli in the said petia. These afford some relief to the ravats, who, by producing plantains, vigetables, and other minor crops, can drag on in times of scarcity without being obliged to go to the famine relief works to obtain subsistence.

I can also mention that from the channels of the big natis, which lokes its course near the village of Jentli and which runs by the villages of Meundi Tambergundi, Mundargi, Shirol, Byalawadgi, Bennehalli, and Ratl in the Mundergi Petha, many gurden lands are watered, yielding sandry crops such as puddy and those mentioned above and also eccurants. A special water-rate (not irrigational) is realized for the use of such water by the Revenue authoristics. I know for certain that these channels help the owners of the lands concerned a great deal. One of such land-owners is my son-in-law, who is a big land proprietor in this district. He obtains different kinds af crops, paddy, sugarcane, etc., and I humbly sulmait that other people wishing to have the use of this nalls, which is a very big one and capable of supplying ample water, may people wishing to have the use of the value, which were blg one and capable of supplying ample water, moy

Momorondum by Witness.

As far as I know, the chief irrigation works in the Charmar district are:—

(1) The Madag Tank in the Ked taluka;

(2) The Asundi Tank in the Banebennur telnka;

(3) The Medjeri Tank in the said taluka.

(4) The Dambal Tank is the Mundergi Petha of the Gadag taluka.

With regard to the first three tanks I am unoble to give any elaborate description as I have had very little time at my dispesal to make inquiries abaut the details concerning here tanks, but I can only soy now that these tanks, sunce and badog, have been the source of great.

Momorondum by Witness.

be allowed to ntilize the water thereof for irrigational purposes on payment af a smoll water-rate. If this thing Shirka it may unfortunately ocean, will be less felt by a certain potition of the people at least, as they can with a little trouble grow grain and regetables for themselves and for other people and wet jowari fodder for their cattle. This jowari, "neer jola" as it is called in Kauarese, is grown in fields having wells by a few prople in this petha as well as clearable to supply foddor to the cattle when there is a detailed description of the Dambal Irrigation Tank. This tank lles in two Revision Survey Nos., viz. :—

Acres Grather

					Acres.	Gunthas.
402		•	•		<i>5</i> 05	34
148	٠	•	•	٠	•••	10
2		•	,	٠	603	4*
		e tan			436 70	'';
					506	4
						-

Before the famine of 1876-77 the area of this tank was 300 acres. It was extended by 130 acres in that year.

In ordinary years, when the tonk is completely filled it irrigates 580 neres of land. In ardinory years, when the tank is full it holds 114,182 millions of ouble feet of water. tank is full it holds 114,182 millions of oubte teet or water. In times of drought it almost gets dry and cannot brigate any portion of the lands, but it is usual for the Irrigation Department to sell grave by auction for the year and also to rent out the bed of the tank for the cultivation of horse and other minor crops at fluctuating rates. This grain and other minor crops at fluctuating rates. This course is certoinly beneficial both to Government and the people, and I humbly recommend that such onliverion may ha more liberally encouraged by Government in times of drought.

The lands on which the consolidated rate is fixed measure 143 neres 29 gunthas, and the area on which no rate is permanently fixed but on which essessment is realized from year to year is about 110 nores.

The amount of meney expended on the repairs of this tank annually is about (its. 140) one hundred and forty. All kinds of repairs to this tank are carried out by the All kinus of repairs to this tank are carried out by the Irrigation Department, the village people not having to do anything in connection therewith. The distribution of water is controlled by the officers of the Irrigation Department, and a gauge clerk on a smoll pay is pastend at Dambal to look after the tank and to monoge the distribution of water. tion of water.

The following crops are grown by the water of this tank:—(1) harley, (2) jowni, (3) heans, (4) sugarcano, (6) paddy, (6) vegetables, (7, fruits such as gunva, plums, plantains, jamhools, lemons, (8) nauca, (9) navani, (10) hajri, (11) tebacco, (12) onions, (13) ohilhes, (14) methi, 15) garlic, (10) flowers, etc. Of these, sugarcane, guava,

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3/2 Shirhatti. 13 Jan. 02. lemon, plantoin, and flower trees receive water for twelve months and are watered once in ten days. Brinjal and ohilly plants receive water for eight months and are required ohily plints receive water for eight months and into equiva-to be watered once in eight duys. Paddy, methi, onions, garilo, tobacco, and vegetables receive water for four months at the intervole of seven days; till (sesamum), jowari, navani, whent, horso gram require to be irrigated once or twice during the year.

The amounts of ifrigation rate realized over the lands irrigated are Rs. 10 per age at the Madag and Dambal Tanks and as high as Rs. 14 for those at Medleri and Asandi. It is understood that there is a proposal by the Irrigation Depurtment for the increase of those rates and I dere say that it is not in my humble opinion advisable to augment the present rates which are already high. able to augment the pressot rates which are already high. I say so because a great deal of money is required to be spent by the cultivator on the lands before he gets the crope home. In addition to the irrigution rates named shove the cultivator has to pay un ordioury assessment of one rupee per acre of land ne asso-ed by the Sarvey Department. Now I shall give some details of the money required to be expended by the oultivotor on different kinds of erops ever an acre of land.

For the sugmenne crops:—

Ploughing ,	Rs. 12 4 15 18	0000	0000	
1,000. Currying the seeds Weeding, 100 labourers Reaping the crops Water-rate Ordinary assessment Watch labourere For preparing jaggery for	1 6 10 10 1 40 48	0400000	000000	
6 doye at Rs. 8 a day.	165	4	_	

The yield of the jaggery from sugarcaue crops obtained for oix dayo' lobour not the late of 3 "Hers" of 8 mannds each, is 18 "Hers" valued at Rs. 150 at the rate of Rs. 10 a "Her."

	Rs.	٨.	r.	
Deduct the expenditure	180 • 166			
-	-		-	

14 12 0 is the net profit. Not only this, but in some years then et profit is as low as Rs. 4 or 6. This is certuinly a very poor gain far a rayat who has been devoting his whole time and the time of some of his family members for a greater port of

For guava, lemons, etc.:-

			Rs.
Clearing the lacd	•		. 12
Digging pits		•	. 2
Manure			. 2
Curriage of manure	•	•	. 1
Wnter-rate	•	•	. 10
Assessment		•	. 1
Labour for watching	•	•	. 40
			68

By deducting this sum from Rs. 80 we have a gain of Rs. 12, sometimes less than that.

Now for brinjol, etc.:—

			Re.	ı.	P.	
Ploughing .			10	0	0	
Mannro			8	0	0	
Digging pits .			1	0	0	
Furrowing	•	,	8	0	0	
Weeding			2	8	0	
Water-rate .			4	0	0	
Ordinary natesament			1	0	0	
Laboar for watching	•	•	8	0	0	
			43	8	0	

The yield comes to Rs. 50. Deduct the expenditure which is Rs. 48-8-0 and the net prolit is Ro. 6-8-0, sometimes much less than this.

For methi, garlie, onione, mustard, chillies, and vegetables, etc. ;

						Es.	-
Ploughing				•	٠.	5	
Seeds		•		~ ·	•	4	
Water-rate	•	•			•	2	
Ordinary as	5 <b>-</b> ess	ment	- •	•	•	1	
Wotoling					•	8	
Re-plunting	3	•	•	•	•	õ	
						25	

Dedact this amount from the yield, viz., Rs. 35, and the net income is its, 10 and cometimes less

The expenditars for the growth of plantains and paddy ranges between that of sugarcane and brinjuls.

I believe that this information is sufficient ut present for the purpose, and I hope to be able to give more information at the time of my evidence before the Irrigation Commission.

I know not of any remissions of the water-rate being given to the cultivatore when the tank fails and their lands remain nairrighted. Thie, I humbly submit, is not fair. Why the cultivators should pay when they are oupplied with no water I cannot anderstand. The rates are water-rates and need be paid only when water is supplied; and, besides, they have to pay the ordinary fixed assessment for the lands they hald the lands they hold.

The constructors of irrigating wells are often assisted by Government by indennees in the shape of tagni. In this respect I nm humbly of opinion that some concession should be shown to the constructors of such wells; for instance, the rate of interest he reduced and the periods within which such leans may have to be repaid should be extended. I seem to so for that in order to encourage the midding that in order to encourage the midding that is not a second or that in order to encourage the midding that is not a second or the second of the second or the second of the second or the second of the sec even go so fur that in order to encourage the multiplication of such wells Government chould be kind enough to make of such wells Government chould be kind eacagh-to make advances to energetic bat certificated poor peopls without any interest at all for n certoin small number of years at leost. This course, if adopted, will had to the unmonical enhancement of such useful wells whereby to mitigate the ovil effects of a future scarcity or famine. Such works are to my knewledge, never undertaken by District Boards but by private land-owners from their own private funds solely, or being assisted by Government by the grant of advances, or purely from the tagai advances granted to their by Government. It has not been the practice of Government to eacourage the coostruction of such works by loans to District Boards.

The protective value of these works will undoubtedly be increased by devoting more money and grenter attention to their up-keep and by encouraging the constructors of new works. Enforcement of local responsibilities in this connection is necessary, and the Taluka Local Founds and connection is necessary, and the Taluka Local Enands and the village officers concerned should be held responsible for promptly bringing to the notice of the Collector, through the Maintadur or Mahulkari of their talukus or pethas, as the case may be, as to the necessity of the construction of now welle or repairs to the existing wells or other scorces of water-supply which may require immediate attention, both for irrigating purposes and for water-supply for men and cattle. This country is well known for scanty supply of drinking water and I have known instances in which men, especially women, have to carry water from a long distance, not to speak of cattle which, though they have plenty of fodder to eat, have to remain setisfied by druking water once during the whole day. What I beg to propose is that in olmost each village where or a running nalm or never-drying well, a well should be or n running naln or never-drying well, a well should be constructed by the Local Boards with a wooden or stony trongh attached therato for the cattle to drink water at.

In conclusion, I have to make na important anggestion In conclusion, I have to make na important suggestion for the construction of a bund over the river Tungabladra at the village of Korlahalli six miles from Mandargi. This bund was originally coastructed, though not completely, by the two brother ministers, ris., Danak and Muddapa, of the now extinct kingdom of Vijaynaagur, at present traceoble in the rains of the selebhated haly ploce of pilgriango. Hompi (the Poranik Kishkiada) in the Bellary district of the Madoes Presidency. This band will, I am afraid, cost a great deal of money and troable, but, if completed, will be a means of irrigating a year area of land, such as that be a means of irrigating a vast area of land, such as that done in the Bellary district and in the Mysore province. Best kind of rice, coceannte and other garden produce are grown to a large extent in the above said provinces by means of canals taken from this river, and much benefit is derived from it. It will certainly hon great been conferred upon the people of these parts if the work I have proposed will be corried out at any cost and trouble, and it will and ubtedly be a means of checking the occurrence of famine and will likewise afford pleuty of labour for faminestrickon people at a future famine.

I respectfully beg to add another important tank exist-ing at the village of Alugad in the Dharwar tuluka, which waters many, a paddy field yielding best kind of rice. This

- tank is not under the control of the Irrigation Department, and no water-rate is realized by that Department, but Shirkatti.

  a special water-tax is received by the Revenue Department in addition to the ordinary land ossessment. This 13 Jan. 02. tank is a big one and may be conveniently transferred to the Irrigation Department, if deemed advisable.
- I expect to collect fuller information as regards the other irrigation tanks and other works of water-supply by the time I shall have to give my cridence before the Irrigation Commission.
- 1. Q. (The President.)-You are Pousioned Deputy Collector Y-Yes.
- 2. Q. What districts have you sorved in ?—I have served in the districts of Bolganm, Bijapur, Dharirar, Ahmednogar, Kneik, Khandesh, and Kolaba.
- 3. Q. You know the district of Dharwar very well?-Yes.
- 4. Q. What districts were you in during the famine of 1676-77 and 1896?—I was manulatdar of Bijapur during the 1876-77 famino.
- 5. Q. And during the last famine?-I had retired before the list famino.
- 6. Q. You say in your memorandum " the brigation rates may be reduced as they are higher than the rates of such tanks as Madag and Dambal." You refer, of course, only to the rates for sugarcane?—Xes, the sugarcane rates are Rs. 14 per acre.
- 7. Q. What are the rates on the Asundi and Medlori tanks r-Rs. 14 for angarcane, its. 5 for 8 month erop. I think Rs. 14 for angarcane is too high. Under the Dambal tank, the crops are better and the rate is Rs. 10.
- 8. Q. The rates are not higher than those on other tanks. In Hijappr and Sholappr and other districts, the rate is Rs. 18 per nore!—That is very exerbitant.
- p. Q. Oo the Krishna Canal tho rate is Rs. 25 per acre? The people in this district are vory poor, and cannot pay such high rates. They are not prevented from growing sugarcane by the rates now charged?—They grow it because there is no olternative.
- 10. Q. If, Instead of lowering the rates of the Asuadi and Mediari tanks Government were to raise the rates of the Dambal tank, would that also satisfaction?—It would, I think, be a great injustice to raise the other tank rates to Rs. 14.
- 11. Q. You say "there are a very few irrigating wells throughout the district of Dharwar." Why are there not more wells?—Because the people do not get any assistance from Government. Unless Government give taken they cannot sink wells.
- 12. Q. Are no advances made in this district for wells? Yes; takavi is udvanced, but the system is defective.
- 13. Q. What is wrong with it?-If a man wants the advance of Ra. 100, he has to journey two or three times a distance of 30 or 40 miles with the patel and kulkaral, who have to be fed on the way, then the karkans at the taluka office have to be pleased; and the man may lose as much as Its. 25 out of the 103.
- 11. Q. What do you propose as the best means of meeting the case? Wo all feel that the system should be made as easy and simple as possible!—I would propose that several central towns should be selected, in each of which a pensioned officer, or a respectable private person should be empowered to distribute Government takeri. He might be a zemindar. The man should be responsible to the mambat-
- 15. Q. Would you pay the man anything for the trouble he takes !- No, he should do the work gratuitously.
- 16. Q. Would be make any restrictions with regard to giving odrances to an insolvent man?—He should give advances on the basis of the fand owned by the man.
- 17. Q. But how would this agent find it aut?—The man tying the monoy, would got the Information from the mamlatilar.
- 18. Q. How long does it taken man at present to get an advance to make a well?—He gets it in two or three months; but he wants it in a week.
- 10. Q. How much does the man get t the whole amount or only a part?—The advance would be a pertion of the cost of the well.

- 20. Q. Who deeldes how much should be given ?- The Collector.
- 21. Q. You must have given out a great deal of money when you were a mambatdar ? No, the system was not in force in my time.
- 22. Q. You say that a man gets a quarter or one-third of the amount necessary for a woll: what does he do for the rest?—The rayat may be given half of what he asks: the remainder he has to supply from his own pocket, or he may barrow it from the sowers.
- 23. Q. Are there many whn go to the Sowear for the whole amount in proference to the Government?—Since the introduction of the new Land Rovenne Act, the sowears are not melined to advance much.
- 21. Q. Sappose the man gots his money, does he complain of the rate of interest?—No, the rate of interest is not high, compared with what the sowcar charges; but the number of instalments should be increased. The instalmonts are taken too soon.
- 25. Q. The law allows twenty years?—That may be, but the custom is to allow ten years only. I think the period should be extended to 20 or 25 years.
- 20. Q. You say "I can also mention that from the channel of the hig nata, which takes its course from the village of Gontli elsewiere \* \* Many garden lands are watered, yielding sundry crops, such as paddy and those mentioned above, and also coconnuts. \*\*I know for certain that these channels help the owners of the lands concerned a great deal." Where is the place of which you write situated?—Genthi is in the Gadag taluka.
- 27. Q. You say that a good deal of Irrigation is done from these channels? Who made them?—They were made about 50 years ago by the rayats with Government senetion. They pay a special water-rate.
- 23. Q. I do not know what you mean by "a special water-rate, not irrigational?"-A rate is levied by the Revenue Department with the ordinary assessment.
- 20. Q. You say, "other people wiching to have the use of this nata \*\* may be allowed to ntilise the water for irrigational purposes or payment of a small water-rate." Who present them now P-No non-ovocers may use the water without the permission of the Collector.
- 30. Q. Then there are rertain land-owners who have a right to the water !- Yes ; no others can usa the water.
- 31. Q. You say there is pleaty of water thore ?- Yes, plenty and to spare.
- 32. Q. Do the people who use it not allow other people to use it P.—The Collector has to eauction the use of the water; but in many cases he does not give exaction.
- 33. Q. tMr. Ibbetson.)—Have you over known the people to apply, and to be refused permission?—Yes; I have known of people applying and being refused sauction.
- 81. Q. (Mr. Muir-Mackenzic.1-Do you know ou what grounds the conction was refused, and can you tell us of
- 35. Q. (Mr. Rajavalna Malr.)—Perhaps the owners of private works and the present irrigators prevent others from taking the water?—The abaumels were built 150 years ago; and I think that the present rayats obstruct the use of it.
- 80. Q. (The President.)-You say I have to make an important arguestion for the construction of a bund across the river Tungahhadra. Has that project ever been examined P-1 think the matter was releved to the Irrigation Department some years ago; but it was decided as impractionable by the Executive Engineer. I hear that a blandara can be constructed at Hangi ten miles to west.
- 87. Q. Do you propose to make a big reservair there?

  Yes, there is a big ruined "hamlhara" at Korlhalli which also I should like to see reconstructed. The river on one slde belongs to Bombay and on the other side to Madras.

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- 38. Q. You say that you "beg to add another important tonk existing at the village of Mugad." How much does that irrigate?—About one thousand acres. It is situated obout seven miles from Dharwar.
  - 39. Q. Is it a second closs work ?-Yes.
- 40.Q. (Mr. Higham.)—Why do you propose that this tank should be transforred to the Irrigation Department?—Because it is a big work, yielding a lorge revenue; and would be better managed by the Irrigation Department than by the Revenue Department.
- 41. Q. What would be the offect of the transfer?There would be better supervision and better control.
- 42. Q. Whot rates do the peoplo poy now ?-Rupees 6 per ocre.
  - 43. Q. Is that o consolidated rate?-Yes.
- 44. Q. If the tonk is transforred to the Irrigation Department, would the rates be affected ?—Yes; perhaps they would raise it.
- 45. Q. It cannot be incressed, if it is a conselidated ato? —The Irrigotion Department may increase the water-
- 46. Q. I do not understand why you want the tank transferred f.—Because it would be under better control. At present there are disputes about the distribution of the
- 47. Q. Have you had anything to do with those disputes P-No, I have not.
- putes r—No, a nove not.

  43. Q. Cannot the people manage the distribution of the water botween themselves?—They querrel about the quentity, and nader present circamstances, the matter goes to the Collector, who notors it to the mamlatan; who sends it on to the Circle Inspector, and great delay occars. If the tonk is under the Irrigation Department, the sub-overseer in charge goes immediately into the matter, which is quickly disposed of.
- 49. Q. Are there mony dispates which have to go before the Collector f-There may be several.
- 50. Q. In many places the people arrange the distribution among themselves?—They go to the Collector when they counct sottle the disputes among themselves.
- 51. Q. You hove 1.000 acres under irrigation, how many villagee are there !-- Five or siz.
- 52. Q. Are there disputes between village and village? -No; generally between people of the same village.
- 53. Q. Are there no disputes between one villago and another?—Very seldom.
- 54. Q. Would the people prefer to have their disputes settled by the Irrigation Department?—Yes; because their disputes would be disposed of with less delay than by the Collector.
- 55. Q You speak of irrigotion from hig nalas, on which special water-rates or charged. How do they get the water on to the land. Do they lift it?—They have open canals.
- 56. Q. Hos each village a separate canal of its own ?-No, one conal passes through several villages.
- 57. Q. How do they clean the canol?—They have parli-ouler limits up to which they have a claim ou the water, they know where their limit ends.
- 58. Q. I suppose they have to clear them sometimes. Who does the clearance?—The rayats clear them themselves.
- 59. Q. If several villoges are interested how do they arrange their shores?—The rayets of each particular village clear the canal in their own limits.
- 60. Q. I suppose there is a lot of eilt at the head of the canal P—Yes, they remove that.
- 61: Q. Whot rates do the payats pay?-They pay Rs. 2 per acre, in addition to the ordinary rate,
- 62. Q. You say that there is always woter in these canals !- Yes.
- 63. Q. Was there water during the famine year ?- No.
- 64. Q. The effects of fomine woold be less felt, if tho people were ollowed to take water from the nata?—Yes; it is not always that the nata is dry; but only in very bod
- 65. Q. Is it the practice to enlitrate the beds when the tonks are dry?—Gram and minor crops are grown: they pay a certain rate of assessment. Some of the ground is sold by anation, and is let to the highest bidder for a period of one year.

- 66. Q. Wheo do they sell it?-When the tank becomes
- dry.

  67. Q. Whom does the land on the banks belong to P—
  The bed of the tonk belongs to Government. The land on
  the tank belongs to the cultivator.
- 68. Q. Where are the anctions hold ?-On the site of the traks ?
- 69. Q. Who holds it?—The sub-overseer, or, perhops, the moistry, and some times, the higher officers hold it.
- 70. Q. Do you do this in case of all tanks !- In most of them.
  - 71. Q. Is there much competition ?-Yes
- 72. Q. Regarding the Dambal tank, you say that 143 ocres are under consolidated rates and 110 a res under wet rotes, that makes 253 acres altogether; yet higher up you soy the tank will irrigate 500 acres. The tank covers 300 rotes, that makes 203 acres attogether; yet higher up you say the tank will irrigate 500 acres. The tank covers 300 acres, and does not irrigate more then 253 acres, i.e., i irrigates a little less than the orea it covers.!—I cannot account for the difference. Perbops the Irrigation Department can explain the matter.
- 73. Q. There is also cultivation in the bed of the tank?
  -Yes, there is cultivation in the Dambal tank in most gears.
- 74. Q. Is grass, which is grown in the bed of the tank also sold?—Yes; it is sold in the villages; and the people from the adjoining villages come to purchase it?
- 75. Q. What do they got for it ?- Something very tring. The people generally use karbi here.
- 76. Q. Suppose Government to make a new tonk, must they pay compensation for the laud?—They must purchase the land.
- 77. Q. Suppose that Government allow the lond to romain with the owner, and let him oultrwate it, would the people object to that?—The people would be hencisted, and they would be glad to have the use of the land.
- 78. Q. Would the people profor that Government should hay the land or let the people setoiu and cultivate it?—They would like to retain the land,
- 79. Q. As a matter of fool, Government always buy the land?-Yes, they can toke it by force under the Land Acquisition Act.
- 80. Q. (Mr. Ibbetson.)—How long have you served in Dharwar?—Five years.
- 81. Q. Straight on?-Yes, four years as mamlatdar and one year as Deputy Collector.
- S2. Q. When did you last serve here?-Fifteen years ogo.
- 83. Q. Whon did you retire .- I retired in 1890, and I have lived here since.
- 84. Q. The whole district is not liable to famine; is it? The costern portion, which is accept one-third of the district, is liable to tamine.
- 85. Q. Does the western portion not suffer ?- No, it has not much suffered since 1877.
  - 86. Q Were you here, then ?-No, I was in Bijapur.
- 87. Q. You know, as a fact, that there was famine in the western portion in 1877?—Yes.
  - 88. Q. And nover since ?-No; not much.
- Sc. Q. In the castern third, what famines can you re-call?—There was famine in 1895,1896, 1898, and the dis-trict is still suffering from femine. In 1876 and 1877 it was very bad.
- 90. Q. What was the state of offairs in 1891-92?—There was secreity: I would not call famino.
- 91. Q. Are there any tanks in the eastern third of this extirt?—No, there are no irrigation tanks; because of the block cotton soll.
- 92. Q. Is it all black cotton soil?—Yes, except in n few cases.
- 93. Q. There are no wells in the eastern portion ?—No, not many and fer the same reason.
- 94. Q. If the people had water, would they irrigate the black cotton soil?—No; it is no good for irrigation.
  - 95. Q. Not even for high class crops?-No.
- 90. Q. What is the depth of the soil?—Three or four feet, and then there is rock.
- 97. Q Then there are no tanks or wells ot all in the eastern territory ?-No, there ore only, drinking tanks and drinking wells to some places.

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- 98. Q. And you don't believe that if they had water they could irrigate black cotton soil  $P \rightarrow No$ .
- 99. Q. Is there only one canal in the eastern part?-
- 100. Q. It irrigales 5 or 6 villages ?-Yes.
- 101. Q. They do their own distribution; and there are very few eispnies. Then why is there so much trouble in regard to the Mugad tank? If the people can manage the distribution of the canal veter, why cannot they manege it on the Mugad tank? What is the difference between the two?—The quarrels on the Mugad are due owing to the tank being an ancient one. The rayats get rich raddy crops; and the people sometimes fight over the quantity of water. Perhaps the people are more quarrelsome there.
- 102. Q At any rate, it is possible for the people in this district to arrange the distribution of water without disjutes?—Yes; but not on the Mugad tank.
- 103. Q. Is the elegrance of channels done by the rayat's own labour?—No; they generally employ labourers to clear the Gentli channels and sometimes the poor rayats clear the canals themselves.
- 101. Q. What is the annual cost of clearance, do you suppose ?—They are not cleared every year, but only once in two or three years. It must cost about Rs. 100 (one bundred), that is morely my ostimate.
- 105. Q. Have you ever heard of disputes of the spiortionment of this Re. 100 ?-No.
- 106. Q. You say that on the l'ambal and Medlori tanks the rates are Rs. 1:1 per acre: is that for all crops ?- No, for sugarcane.
- 107. Q. Is all the water in these tanks used?—Yes, there was never an left.
  - 108. Q. They Will use; but they cannot get it?-Yes.
- 109. Q. Then why do you propose to reduce the rates? Because in famine years, there is no water, and they still have to pay.
- 110. Q. Is no remission given F-The rate is a consolidated one, and no remission is given.
- 111. Q. Is not the lond measured up; and then a charge is made?—No, the charge is a consolidated one, and the money is pold in advance.
- 112. Q. The rate of Rs. 14 is not consolidated?— The Rs. 14 is charged for the water they take for their lands. Even, when there is no water in the tanks the assessment is charged, and no remission is given.
- 113. Q. Do I understand you to say that its. 14 is charged though there is no water in the tank P.-Yes.
- 114. Q. (Mr. Muir-Muckenzie)—Who takes this rate? The Revente Department or the Irrigation Department. It counds impossible. Mr. Beale, perhips you can help us?—Mr. Beale.—There is no charge when the water is not taken.
- 115. Q. (Mr. Rajaratna Mdlr.)—On Gentli nala a special rate for irrigation is charged?—Yes, Its. 2 on note for water advantages, independently of the land assessment.
- 116. Q. No matter what crops are grown?-Yes; they generally grow sugarcane and regetables.
- 117. Q. What area is assigned to each rayat?—No definite area is fixed; some have five acres; some have six; none less than two acres.
- 118. Q Can they sell the water to other rayais? No, unless they sell their land also.
- 110. Q. The nala was constructed by the rayals at their own expense and the water practically belongs to them. Can ther sell it and lovy a noter-rate just as Government does? No, they cannot sell the water.
- 100. Q. Why should they not rell the water and allaw other people to irrigate?—It is not the custom.
- 121. Q. Is there anything to prevent them from doing so?—I believe there must be some departmental order preventing them from doing so.
- 122. Q. Is there water available for the irrigation of an additional area?—Yes, about 40 or 50 acres more may be irrigated, if sanction were given, as there are other willages through which the nala runs.
- 128. Q. Could it be utilized without affecting the interests of the owners of the nala?—It could be done without interfering with their interests.

- 124. Q. Then why do the owners object to supplying waler to other people?—Because the supply will be less for their fields.
- 125. Q You say that 40 or 50 extra acres could be 13 Jan. 02. irrigated P—Yes; but the owners wen't allow it.
- 126. Q. Suppose we allow them to levy a water-rate. Do you think they would consent?—No, they would never council.
- 127. Q Would they not make a profit?—No, they think they would be lesers thereby.
- 128. Q. What is the area they irrigate now?-About two hundred neres.
- 129. Q. If water is available for 40 acres more why should they object, if they are allowed to lavy a water-rate of, say, Its. 2 an acro?—The present rayats would not be benefited.
- 130. Q. Has your son-in-law applied for permission to irrigate more land?—No; he is a 2nd class Sirdar living at Mundergi.
- 131. Q. Does he now object to the extension of irrigation ?—Yes.
- 132. Q. Ilas he any other land under the nala, besides that already referred to?—Yes.
- 133. Q. Has he applied to the Collector to irrigate that ?-No.
  - 134. Q. Why not?-I cannot say.
- 135. Q. As regards takuvi loans, you say that corruption of the village officers and delay in payment deter people from applying for advances freely. And you propose that committee of influential native gontlemen should be appointed. What guarante have you that they will behave any better than the village officers?—They will be people of pesition and, therefore, houest.
- 130. Q. Do you think it would be safe to go on the result of their inquiries?—Yes; they would have to ask the mambathar's assistance in their enquiries.
- 137. Q Would they not be alraid of the tabsildar coming down upon them?—No, I dun't think so, because they me men of position and often-times educated.
- 139. Q If the money is misspeut, would not the tahsildars of one down upon them?—No, they would harly misspend the money.
- 132. C. Then, why cannot the tabelliar do it binself:—Recause he has to travel, and if he had to give advances the people would have to travel, which would be very troublesome.
- 140. Q. He can make inquiries in the villages be visits?
  —Yes; but he may take two years to go round in his taluka, and he might have criminal and other cases to attend to.
- 141. Q. As regards the disprice about the distribution from the Mugad tank, why do the people not go to the Circle Inspector, instead of to the Collector, to have their disputes settled P—The Circle Inspector draws its. SO (thirty) a month; and ie has multifurous duties to perform, the extent of his best extending over forty villages.
- 142. Q. You say that the profit from cane caltivation is its, 14-12-0 per acre. Do you speak from personal experience !—Yes, from personal experience and from information from my son-in-law, and other practical mon.
- 113. Q. I want to know if your estimate of Re. 14 12-0 is not very los P-No, it is not very low.
- 141. Q. We have had any mnount of evidence to show that the profit on sugarcane has been more than Rs. 100 per acro f-My experience relates to the Dambal tank only.
- 146. Q. (Mr. Muir-Mackenzie.)—Have jou ever grown sugarenur on your own lands ?—No. My son-in-law gots 18 liers of "gool" per nore.
- 146. Q. How much is one her?—Eight hundred and thorty-two tolas make one her, 20 tolas make one ser; and one her is valued at Rs. 10; and 18 hers is equal to Rs. 180 in value. He spent Rs. 105 to raise this crop.
  - 147. Q. Then it does not pay ?- It gives him some return.
- 149. Q. What is the measurement on that land?—Rs. 10 water-rate; Re. I land assessment per acre.
- 140. Q. It will pay him better if he cultivate dry orop?
  —Yes; but the rainfull is so scanty that a cron enuner ha

- Mr. 150. Q. (Mr. Rajaratna Mdlr.)—The average area inigated per well in Dharwar is given as 4ths of an ocre, os compared with over three nores in Sholapur and 2.27 in Bolgaum. Can you explain the difference?—I connet.

  151. Q. What is the average area irrigated in Dharwor per well?—From one to five acres.

  - 152. Q. Have you say reason to suppose that it is less that in Bijapur or Belgaum?—I see no reason for any difference between here and Belgaum.
  - 153. Q. There are about 2,400 irrigation wells in Dharms. Are there any facilities for the construction of more? -Yes, a fow more could be constructed.
  - 151. Q. Do you think that the rayate could be induced to construct if Government romitted the water-rate?—Xes, if the water-rate was exempted for 'n certnin number of years, n few rayets might do so.
- 155. Q. What period of exemption would you suggest? Twenty years.
- 156. Q. Yoo say that "I oven go so far that, in order to caccurage the multiplication of such wells, the Government should be kied enough to make advances to caccyclic certified poor people, without any interest at all". To what extent do you think the number of wells would be increased in the whole district? Would it be doubled if this concession were allowed?—Perhaps one hundred wells in each of the cloven talokus. Eny, one thousand altegether. That is the maximum limit. the maximum limit.
- 167. Q. (Afr. Ibbelson.)—Including the three black soil talukas ?—No, the three eastern black soil talukas must be excluded except, a few villages in the Mundargi Peita of the Godog taluka, and a part of the Ron taloko.

#### Witness No. 83 .- Mr. JANANDAN SADASHIT Athoric, Pleader, Gadag. Answers to printed questions.

Mr Atharle. 13 Jan. 62

As very little time was nt my disposal I could not collect information for the whole district of Dhorwar. Dharwar district has cloven tolukas of which Gadag Is one, I am a resident of Godag and any laformation that medicate to Gadag is equally applicable to Navalgund and Iton Talnlas, as the character of the soil and cluaatic influence are one and the same. I therefore confine myself to Gadag Talul:a.

Point No. (2) (a). The gross and culturable meas and the proportions of the latter which are protected by Gov-ermount irrigation works, by private or village works, or by wells respectively are as follows:—

- \* Acres gross area.
- Acres culturable area.
- 550 Acres protected by Government irrigation work (only one tonk at Hambal, a petha town in Gadag talaka). The bed of the tank is 436 acres and the mea of the feed channel is 70 percs. 4 gunthus. This tank holds water 114 182 millions of cublo feet, or 11 feet hands when the full. height when full,
- (b) Character of the coil.—Black, red, the mixture of black m d red and eard, and ted with eard.
- (c) Extent to which cultivoten is dependent on artifi-

  - (d) Reinfell .- 24 inches.
- (e) Is there ordinarily a demand for water in the Decem during south-nest monoton?—Ver, and the mere so or greater the demand if the inhifull in the purposes year Lad Iallen short of the average.
- (f) What are the enqs which require irrigation and how many waterings do they require and at what times of the year?—I'addy, sugarcane, plantom trees, betel-leaves, guerra, lemen, and pamegranate trees, onicas, potatos, chillies, and all sorts of regetables and telesco. All their require two waterings in a week throughout the year until the crop is ready for harvesting, but one will do when the reins fall in sufficient quantity. I say throughout the year because the duration of the crops is not the same as shown below: ebown below:
  - Paddy -Two cross six-monthly, November to April and May to October.
  - Sugarcare.-One crop, cleven or twelve weaths from February.
  - Plantain trees.—Only one crop twelve mouths after plantation from June. The stem is preserved because the original tree treets young ones which again yield fruit in their tora. The stem of the mether-tree is preserved for three years.
  - Belel-leares.—Two crops every six months. Plants live for ten years if well nourished; first crop is raised three years after plantation.
  - Guara, lemon and porsegravate trees.—Two erers, one full and the other half. First erop is mised twelve months after plantation if will nontished. The former trees live for upwards of 35 years and the latter six years.
  - Chillies .- Only one crop in twelve months and no more.

All other regetables. Only one crop in six months ond no more.

- (9) How is the distribution controlled?—By Irrigating well-water by means of a mot (a leather bog containing 12 to 16 ghadas or 80-40 gallons of unter).
- (2) And in what form is irrigation arrenno maliad? The revenue is realized by consolidated assessment collected by two instalments, or by fixing a water-rate or tax on lands not subject to consolidated assessment, but receiving rater from Government tunb whenever there is a samples after giving it to the owners of lands subject to consolidated assessment.

Point No. 3.—Experience as regards black soil. Small tanks constructed in black soil hold rater and high earlien dams can be made enthunt traspary core walls. In the rate of hand being irrigated, being black soil, there is no demand for water during resons of average rainfall. But even in short drought there is decaudd for water. In such soils the irrigated ares does not show a falling-off in years of fair or good rainfall owing to slack demand and the returne is not more precurous on this menunt than on tanks commanding other classes of soils. These has been a desire for irrigation works on the part of owners of black soil, and the construction of tanks for such soil is considered reminerality of a supportant in for other classes of soil. But the cost of constructing tanks in such soil is comparablely very large and pilrate owners of lands cannot be expected to constitut the tanks with the Ir noise without free leans from the sarbar on her rate of interest and a long period, say, 20 years, for repayment of the I am.

Point No. 6—District or Village verks.—The dis-

Point No. 6—District or Village works.—The dis-trict or village works are constructed by the joint funds of the particular village in which the tank is constructed, the District Local Board and the Government grant. But the cultivation is not dependent on them as these tanks are constructed for the purpose of drinking water both for non and eattle. Ordinary regains to such works are conde constructs for the purpose of crinking water both for ten and entile. Ordinary regains to such works are reade of the cost of the villagers and extract living or aspecial regains at the cost of the District Local Tourd or of both. To all these auts of tauls there is but one exception and it is the tank at Dambal, and the higheregate extent of enli-ration dependent on this tank is 600 arres and the Govern-ment is re-possible to maintain it under the Irrigation Act. The appraise a namel expenditure increased by ment is responsible to maintain it under the Irrigation Act.
The average annual expenditure Incurred by Convenuent on this work is 18, 149, not including expenditure in relief work doring late families. Irrigation is realised or remissions of land revenue are given according to the orders of the Government when the works fail. No non-works of this class lare leen constructed of late years; nor even as frames aware. Such works are not undertaken by Institut Beards or by private lands where as they are not permissible under the District Local Peards act and are beyond the means of the District Boards or private landsowners. It is not desirable that District fonds should be expended on such works unless the Government gives loan to the District Boards. It has not been the practice for Government to encourage the construction of such works by loans to District Peards. The protective value of these works can be increased by diveting more money and greater aftertion District Peards. The protective value of these works can be increesed by directing more money and greater refeation to their up-keep and by encouraging the construction of new works. Local respeciabilities might be inferced in this connection by permanent increase in consolidated resenue and by making the continuar village or district benefited by the new works hear a certain portion of the cost incurred by Government or by the Plattlet Boards with the help of the

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Government. Construction of such works as concerning village water-supplies for men and cattle is equally important.

Point No. 7.—Total area irrigated by wells in ordinary years is acres, and in years of drought is acres. The number of new wells constructed annually during last ten years is as shown below:—

	1893.	1993.	1891	1896,	1896.	1807.	1808	1899-	1900.	100°.	1002
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Government has assisted the construction of such works by making advances, viz., Rs. No concessions are given to the constructors of new wells. It is possible and desirable to stimulate the construction of new wells by more liberal advances and inducements. More than half the

- 1. Q. (The President.) You are n pleader and practise at Gudug ?-Yes.
- 2. Q. You no n native of that place?—Yes; I know the taluka very well.
- 3. Q. The information you have given in your printed memorandum is about that talaku !---Yes.
  - 4. Q. It is in the eastern part of the district P-Yes.
- 5. Q. You say that paddy requires two waterings a week throughout the year. Is much paddy grown in your taluks from November to April?—Not in my taluka. Much is grown from May to November. In the adjoining taluka it is grown from November to April.
- 6. Q. You say, "There has been a desire for irrigation works on the part of owners of black soil and the construction of tanks or such other works is considered remnnerative and as important as for other classes of soil." Is that deep black cotton soil?—Yes, it is deep black soil.
- 7. Q. Do the people irrigate it?-No, but they want to do so.
- 8. Q. There is only one tank in your talnkn—the Danhal ?—Yes, they grow paddy, sugarcane, and vegolables under it.
- 9. Q. Do they grow cotton, and would the poople take irrigation for that crop?—Yer, they would irrigate cotton; they do not irrigate it now.
- 10. Q. To point 6 you say, "The district or villags works are constructed by the joint funds of the particular village in which the tank is constructed, the District Local Board and the Gaverament grant." Does the District Local Board have much to do with irrigation tanks f—No, the tanks referred to are drinking water tanks.

number of wells have been affected by the droughts of 1899 Mr. Athavle—1901 as shown below. Some of these which ran dry were despensed; and the result was that the average annual 18 Jan. 02. crop was obtained to a fair extent. Number of wells that failed or were ahandoned cannot be ascertained, but is very small. Average depth of water below surface is 12 to 15 feet, that is, if a well be sunk 40 feet deep, water is found 28 or 25 feet below surface, and the depth of water is 12 or 15 feet. Cost of wells used for irrigation and area served by each are as shown below:—

Cost in rupces.	Dimensions.	Area served,	Bomarks,
'			
8	A		·

- Note.—Only five days were at my disposal, and I could not get the figures in time. I shall forward the figures later on or give them at the time of giving evidence before the Commission.
- 11. Q. Does the Dambal tank do a great deal of good?-
- 12. Q. What happens to it in a year of drought, does it dry up P-Yos.
- 13. Q. (Mr. Muir-Mackenzie.) How is the water-supply obtained generally for the villages in the Gadag taluka?—The water-sopply is generally obtained from wells.
  - 14. Q. How deep are the wells ?- About 40 to 60 feet.
- 15. Q. That would be the nead depth to which a well would have to be sunk if it was wanted for irrigation?—Xcs.
- 10. Q. What would be the cost of such a well ?—A well 80 to 40 feet in diameter would cost about Rs. 4,000, and more if the seil is loose and gives way if not built with stone and chenam.
- 17. Q. Are there not smaller wells P—Yes, some are 20 feet in diameter, but never less.
- 18. Q. How many mote would there be on such a well?— Two mote if the water-sapply is good, otherwise only one met.
- 19. Q. How many neres would a well of that size irrigate P-A 20 feet well would irrigate about 5 acres.
- 20 Q. (Mr. Rajaratna Mudaliyar.) Why ore the wells so big; would not a well 10 feet in diameter does well if it was dug deeper?—No.
- 21. Q. (Mr. Muir Markenzie.)—Why not P-A small diameter would not do, as sufficient water weald not be obtained.

WITKESS No. 81 .- ME. O. C. BOYD, I.C.S., Acting Collector of Dharwar.

- 1. Q. (The President.)—You are Collector of Dharwar?—Yes.
- 2. Q. You'say that very little is taken in the way of takavi for wells !—Yes, very little for wells. In Belgaum, where I was for six years, you cannot sink wells in black cotton soll. And you can hardly do so in this district; consequently there is a small demand for takari for that purpose.
- 3. Q. Is the grenter part of the district black cotton seil P-No, only ene-third. The western part is hilly and woody and gets lots of water. And there is very little demand for wells.
- 4. Q. In the part where there is black cotton soil they don't want wells. Is it because the spring level is so low f-Yes, they have to go down 100 feet to get water, and then they find that it is brackish.
- 5. Q (Mr. Ibbetson.) Is the black soil very deep?—From seven to ten feet.
  - 6. Q. What is below ?-Sandstone and rock.
- 7.  $\bar{Q}$ . Supposing the people are given wells for nothing, could they use them ?—No.

- 8. Q. Having that source out away, and considering there is a distinct famine zone in this district, we are thrown back apon lanks and canals, whet would be the prospect of the people in the black cotton soil districts, taking water?—Tanks and canals are the only form of irrigation works for this district. The Gekak runs through black cotton soil; and has magnificent crops, but the soil is only three to five feet deep.
- O. Q. Why nre there so few tanks in this district?— There are very few big works; but there are 2,000 small village tanks irrigating from two to four hundred acres, on which consolidated assessment is charged.
- 10. Q Are these tanks in good order ?—They vary very much. They were built hundreds of years ago. No one knows by whom. Probably by some previous Government or by some rich people. The people under them are now not rich enough to unintain them. Government levy a low consolidated rate, and does not grant remissions.
- 11. Q. Have the people a feeling that they have elsewhere, that it is the business of the Government to keep them in order?—Yes, they think that the Government should repair the tank. When the people pay the 10 per

Mr. Boyd. 18 Jan. 02.

Mr. Boyd. cent., which happens in very few cases, the tank is repaired:
not otherwise. I would like to suggest that the 10 per 13 Jan. 02. cent. contribution be abolished.

12. Q. Would you recommend that all the tanks should be repaired as money and officers are available?—Yes. I may mention that Mr. Shankridgo etates that owing to the 10 per cent. contribution he can only spead Rs. 60,000 a year, whils the establishment toost is also Rs. 60,000; whereas, if he could spead four times as much, were it not for the 10 per cent. restriction.

[Mr. Muir-Mackenzio.—I don't think I am promature in announcing that Government have desided to abolish the 10 per cent. contribution for repairs of tanks.]

[Mr. Rajaratna Mudaliyar explained that the Madras Government repaired all small tanks by the agency of the

- Government repaired all small tanks by the agency of the Roveaue Department.]

  13. Q. (The President.) De you think that Government, having once put these tanks into repair, should go on maintaining them, or do you think it would be for the people to keep them in repair?—I de not think the people have the capital or the cambination to do it.
- 14. Q. You say that the people don't mind takavi in ten years?—No, the people do not object to paying back the takavi soen, if they get any heaefit from it.
- 15. Q. You are not alluding taken; for wells, because the people do not take any for that?—No; I was allading to what was said at Lijapur regarding the fact that the people do not like to pay back the taken; soon.
- 16. Q. Whon the oultivator herrows from the Sowcar, he never proposes to repay?—I have given out many thousands in takari; but I have not heard a single instance of people heing unwilling to return the loan in time. When cultivators borrow from a Sowear, they in many cases mean never to rapay and expect to pay the interest ne long as they live. Their custom is either to pay a debt soon or not at all. Thay take takari, meaning to repay it and knowing they must. So they are quite willing to repay it fairly soon.
- 17. Q. Do they complain at all of the rate of interest charged?—No, the Sowear charges from 30 to 40 per centre But they do complain of the delay in getting the advances. That is a question morely of having a larger establishment.
- 18. Q. If we are to bave protective works in this dietrict, and wells are not possible, we must have either tanks or canals. I understand that certain projects have been prepared; can you meution any of them?—Instructions were left to me by my predecessor to push on several of them in case of future lambus occurring in this district.
- 19. Q. Which is the most important of them f-A new tank at Pudkalkati which is north of Dharwar.
- 20. Q. Is it n small tank?—No, it is a new tank, which will cost 6} lakhe of rupees, and will prove useful to the North-West Frontier of the famine area.
- 21. Q. Would it get a good water-supply ?-It is bound to be successful.
- 22. Q. Of course the anxiety is that tanks not connected with a rainy zone may fail in dry years ?—Part of a catchment is in a sphore which is generally well supplied with
- 23. Q. There is austher tank at Kardikop in the Habli talaka, six or siven miles from Huhll?—Yos.
- 24. Q. (Mr. Muir-Mackenzie.) That is rather far from the famino tract P—Yes, that is true, ahout 25 miles.
- 28. Q. Are there any other works that you would like to mention?—Yes, the extension and repairs of the Dachal tank. This tank is in fumine area and is very neglel. All these are very important. The most important of them, however, is Pudkalkatti. We could casely spend 18 lakhs or 14 lakhs very neofully on these works if Government could let us have it. I see at page 338 of Mr. Beale's report that Mr. Strange condemned the Padkalkatti tank, as it submorged several villeges?—It would have a canal of six or seven miles, which would do a great deal of good. Mr. Gihh, my predecessor, thought that any submerging that might result will be someterbalanced by the amount of good that is likely to nearne. The villages are very small indeed.
- 26. Q. Are there any other works?—No, I would only recommend these three, as useful for fature famines.
- 27. Q. Are they situated in black cotton sail areas

  -Kardikop is mostly in black estten soil; and Pudkalkatti
  is in half-and-half; bat I have not seen it.

- 28. Q. (The President.) We have had a good deal of discouragement in Bijapar, where these tanks are; but the people persistently refuse to use them; so that one is a little unxions about making tanks in hlask sotton soil?—Yes, but I would point to the Gokuk could of which the water is need. However, in the best hlask cotton soil, with the least rain, the people get a good crop, so that there might be no demand for irrigation is good years.
- 29. Q. With regard to the small tanks under the Rsvanue Anthorities, do they apply to the Executive Eugineer, to repair them, or do the owners apply straight to the Public Works Department?—The owners apply in the first instance to the Collector to take their 10 per contractivity. oest. cantrioution.
- 30. Q. Ie ue information given to the Executive Engineer till the money, is collected P—They will probably tell the Executive Eugineer at the same time.
- 31. Q. Does, the Executive Engineer not receive the upplication in the first instance?—No, the Collector receives the application and seads it to the Excentive Engineer to make the estimate.
- 32. Q. An argument has been need in favour of the 10 per cent, contributis athat it best indicates the comparative argency of the different works. Suppose you had no coalibation at all, how would you decide the order in which to execute the works?—The argency of the repeirs could easily be settled between the Executive Engineer of the Irrigation Danartment and the Collector. the Irrigation Dapartment and the Collector.
- 33. Q. 1 suppose there will have to be a complete curvey and systematic record kept of the canditians of the various tanks?—Yes, the Excentive Engineer knows prelty well in what conditions the tanks are; and so does the Callector and Assistant Collector.
  - 84. Q. There are 200 tanks in this district ?-Yes,
- 85. Q. If you receive applications for the whole 200, it would be difficult to determine which should be dealt with first?-No; I do not think so.
- S6 Q. Of the various schemes proposed for the district, which would you prefer to see push forward first?—The Padkalkatti tank.
- 37. Q. On any of these worke could famine labour be omployed?—Yos, famine labour could be employed on the Pudkalkatti taak.
- 38. Q. Have you a number of tanke entered in your Famiae Reliof programme?—There are very few tanks entered on the famine programms. They are of very little use as femiae relief works in this district.
- 39. Q. Would the people go some distance to work on a tank ?~Yes.
- 40. Q. How far would they go?—Fifteen miles is about the limit, but it takes a very had famine to make them go fifteen milcs.
- 41. Q. And apparently nothing can be done for this most exposed part of this district P—I de not know what is possible to do for the black estlen soil area in the way of irrigation, except the Pulkaikatti tank, unless there is some prospect of damming the Malprahha river-
- 42. Q. Whatever is done, the water will only he required in famine years?—Yes, only when the min fails.
- 43. Q. In famino year, they would not take waler for cotton?—The crop semetimes falls in a famine year; but I have never heard of cotton being irrigated.
- 44. Q. If they had tanks, would they grow juari?— They might grow juari or wheat.
- 45. Q. Would they grow rice?-No, that would linvolve too great an expenditure.
- 46. Q. (Mr. Ibbelsan.) Too great an initial expenditures Hawlong have you hese in Dharwar ?—Six weeks this time, but I was here for a year cleven years ago.
- 47. Q. Where were you hefore you came here?—In Belgaum and the Kauara district.
- 48. Q. You say many of the small tanks are out of spair. What is the matter with them?—They are eilted
- 49. Q. Apart from that?-So far as I know that is all.
- 50. Q. Would you propose to clear them out?—That is usually unsuccessful.
- -51. Q. And what would you do lo them?—I do not quite know how the repairs should be done
  52. Q. You think, if they were handed over to the people, they would not repair them?—No, the people certainly would not do the repairs.

- 63. Q. Mr. Shirbatti told us of certain channels which the speeple repair themselves at a cest of about its. 100 f—Yes, but that is an exception.
- :54. Q. Supposing we legislate, and make the people responsible, sould not a good Manulathar make them combine and keep the tank in repair if he had the necessary power at his back?—No; in this district the people are so unsophisticated as to be is capable of combining.
- 55. Q. If the repairs were necessary the Mamlatdar could use the legislative power ?—I don't think the necessary presente could be applied; and the Mumlatdar has not enough technical knowledge to know what repairs are required when a tank is out of repair.
- 56. Q. Have you had any experience of paying takavin ordinary years? Yes.
- 57. Q. What you have told us, then, is not based merely upon famine experience. You say that there have been many years of famine in this district. Mr. Shirbatti told us only a few?—There was not famine in 1899. We have had scarcities requiring relief, but no regular famine since 1876.
- 66. Q. (Mr. Rajaratna Mudaliyar.)—You say that there is no difficulty in recovering the takavi loan P—I have nover known a case in which the loan has not been paid
- 50. Q. In most cases, were not the lease very small?—No, they range from Rs. 200 to Rs. 2,000. The average is about 800 or 400 rapides.
- 60. Q. What kind of works you lend the money for ?-
- 61. Q. Woold these works cost large sams?—Not very, but weeding takes a lot of time: they spend some of the money and keep a little. We caunot prevent a little misappropriation. They don't take more than a small percentage.
- 62. Q. Would not inspection by the Revenue Officers prevent this misappropriation?—Yes, but we have not the establishment.
- 63. Q. What staff is required for an efficient inspection P-We should have additional Mambatdars.
- 64. Q. What amount was advanced in the district of Belgaum in the famine year for wells and other improvements of land?—Speaking from memory, about 1½ lakhs. (The President quoted proper figure, viz., 2,16,056.)
- 65. Q. Were any steps taken to shook the work under these advances?—The Revenue Officers inspected the work sometimes before, but generally afternards. The Assistant Collectors inspected a lorge number of works. The inspection of the fakari works is a very important part of his lievance work, if he can only get the time to do it.
  - 66. Q. Is he required to submit a report ?- Yes.
- 67. Q. As regards the Golah canal, the Deputy Collector told us that, if the extension could be carried out, a very much larger area could be irrigated?—I cannot tell you mything about that, as it is six years since I was at Belganm.
- 68. Q. (Mr. Muir-Mackenzie.) You said the people who horrowed money for hand improvement were content to pay it back within the reasonable period of ten years. Don't you think it would be advisable to extend the period so as to attract the people of a less provident class F—I don't think there is any need to do so. It might make the result feed that the advance used not be returned. the people feel that the edvance need not be returned.
- 69. Q. You would not approve, even if an experiment is made in that direction ?— No, all that is wanted is promptness in dealing with applications for advances and thorough, but not too severe, inspection of the work done.
- 70. Q. There has been a good deal of ovidence that the people are reluctant to borrow, owing to the rigidity with which the instalments are recovered. You do not agree with thet ?-No; I have never come across that. Hardly may one

- asks for a pestponement beyond the ten years. If he asks, Mr. Boyd. he gets it. The advances are given for weeding and ombankments, and semotimes for conversion of dry into rice lands. The profits on those come soon, and they come refund early. If you give takavi for a well, the period might be extended to fifteen or twenty years.
- 71. Q. You would not even recover interest until the well has been in use for some time?—No.
- 72. Q. I thought you meant a pumper raynt would come on to relief work, for instance?—I do not call a man who has land a pauper. Oely coolies come on to relief work. It would take two years of famine to bring a raynt landowner on to relief works in this district.
- 73. Q. Can famine labour be employed on talk or small embankments ?-No, the people could do it for half the cost themselves.
- 74 Q. Then it would not be possible for Government to use famine inbour on these works ?—It would be difficult to decide whese embankment should be made. The works would be so scattered that supervision would be quite impracticable.
- 75. Q. You need not make them on a large scale ?-The
- 76. Q. (Mr. Ibbetson.) Why not estimate the amount of work that has to be done, and make over gangs of famine labourers to the people to work on the land, telling them to employ them for a definite number of days, and got what work they have done?—The people could not get good work out of fumine labourers, who do as little as they can.
- (Mr. Mnir-Mackenzie to Mr. Ibbetson.) You have a head man in the Punjab villages, who could make the people work: we have not?—(Mr. Ibbetson.) That is the crex of the whole thing.
- 77. Q. As regards the inspection of takeri work, I suppose something more might be done to do the Assistant Collectors inspect the boundary marks?—To incilitate the taker inspection work, the boundary mark inspection might be relaxed, as the marks are in an excellent condition.
- 78. Q. About the repairs of small tanks, you seem to have read the orders of Government in mean that the tank is not to be repaired, unless the contribution of 10 per cent. is paid?—I understand that 10 per cent. contribution can sometimes be foregone, but seldom is.
- 79. Q. (The President.) Is there may other point you would like to call our attention to ?-No.
- 80. Q. (Mr. Muir-Mackenzie.) Do any people pay for water which they do not receive?—Yes.
  - 81. Q. Would you say 10 per cent. ?- About 5 per cent.
- 82. Q. Do you menn 5 per cent. of the tunks or 5 per cent. of the nrea?—Five per cent. of the area.
- 83. Q. Do you menn in ordinary years, or in years of short rainfall?—Often in ordinary years if the tucks are in n bad state of repnir.
- 84. Q. Do you think that Government ought to ubandon some of the tanks, or put all under repairs f-I think they ought to ubandon the one-man tank, and repair all the others.
- others.

  BB. Q. There was a rule in 1865 that, without the sanction of Government, repairs should not be undertaken if they coat more than 10 years' water-revenue. Do you think that rule should be relaised?—No, I think not; I thick the rule might be relaxed in the case of certain good tanks. There are several fine big tanks in this district which badly need repairs. One of them, that at Hirekeur, irrigates ever 500 neres. The repairs to it would be costly; but it is well worth keeping up, and at present sonny, of the people pay consolidated rates and get no water; and they have suffered in this way for a long time. I may add that it is hepeless to expect to run tank irrigation in these parts profitably to Government. in these parts profitably to Government.
- WITNESS No. 85 .- Mr. II. B. Shoubeldor, Acting Executive Engineer, Dharwor Irrigation.
- 1. Q. (The President.) You have only just come to Dharwur!-Yes; I have only been here 4 or 5 months.
  - 2. Q. Where were you before that f-In Sind.
- 3. Q. So that you have had very little time to ascertain the requirements of the district ?-1 have seen a good many tanks during the last few months.
- 4. Q. Have you any suggestions to make in regard to irrigation works?—I think that tank repairs should be
- carried out by Government, as the people cannot do it themselves. They do not carry out oven the most petty ropairs that are roquired.
- 5. Q. Putting all the tanks into repair would involve a great expenditure?—Yes, and a good deal of plan work would have to be done.
- 6. Q. In many cases would it not be merely a matter of rai-ing the hunds so many feet ?—Yes, but in many of

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these tanks there are no pakka outlets and no waste Shoubridge. weirs.

- 7. Q. No wasto woirs at all P-In most cases the 13 Jan. 02. waste woirs are merely oots, some have no waste weirs at all.
  - 8. Q. Could you give us an estimate of what would be the cost of repairing the tanks in the Dinewar district? -I could not say.
  - 9. Q. (Mr. Muir-Mackeuzie.) Twolvo or thirteen ikhe was, I think, the amount of the estimate which came hefore the Government.
  - (Mr. Higham.) I believe the figure is 131 lakhs.
  - 10. Q. After the repairs are finished, there will niways be current repairs?—Yes, which the Department will have to do. The owners live away from their fields which they let to tenants, and as long as these latter get water, they do not care what the state of the tank is.
  - 11. Q. Yau think the work of repairs ought to be taken in hand?—Yes.
  - 12. Q. How much can be done per annun ?-I think more might be done if our methods were a little less
    - 13. Q. Are you employed on irrigation alone P-Yes.
  - 14. Q. Do your irrigation haundaries go beyond this district?—They go into Kanara.
    - 15. Q. Not Belgaum and Bijapur P-No.
  - 16. Q. Do you know of any large project worth ecosidering in this district? Any project for ghat otorage from which an unfailing sopply could be got?—There is only the Madag tank; the Dharma Caual is not in the
  - 17. Q. The Madag Tank is on the borders of Mysore?— Yea; I have not seen it, but it strikes me as a good project.
  - 18. Q. Would the Asondi tonk be filled by the Madag? I do not know
  - Beale explained that it woold not, as the Asundi Mr. is up stream.
  - 19. Q. Is there any other project which occurs to you which you would like to suggest ?—No.
  - which you would like to suggest ?—No.

    20. Q. What about the order in which you take up the repairs of tanks ?—The petition is sent to me, and not to the Collector. I cend it to the Suh-Divisional Officer for report, and he tells me roughly what the repairs will ent. Estimates are prepared in the order of receipt of application. I do not wont to have applications which idvolve the scattering of establishments all over the place. I cannot sanction the expenditure, the estimates go to the Superintending Engineer, and the allotment is only made after approval by the Collector. I want to do away with the areas and take up one block or catchinent at a time. I would call for applications giving notice that in a certain area the tanks will be repaired.

    21. Q. (Mr. Muir-Mackenzie) You wish to repair
  - 21. Q. (Mr. Muir-Mackenzie) You wish to repair the tanks by catchments When the order for the removal of the 10 per cent. contribution is recoised, you can arrange matters as you like?—Then the question of estimates will come in under the present rules; the estimates have to be prepared very exactly; and if there is an excess of more than 6 per cent., a revised estimate has to be outmitted. This necessitates very close survoying and a good deal of wasto of time. I think we should be given a free hand.
  - 22. Q. (Mr. Higham.) But when the estimate is exceeded, revised estimates need not always he necessary: any excess can be passed on completion of the work?—It is best to get it passed beforehand, so as to save a long list of explanations
  - 23. Q. How much can you sanction for repairs your-lf P. I can only sanction repairs up to its. 200. Very little can he done for Its. 200.
  - 24. Q. How do you work out the limit of ten years revenue? Soppose the estimate of the work came to about ten years revenue, how many years after that can you go on speuding money on the same tank?—The previous estimate of the tank has to be reported.
  - 25. Q. But, if you have to make repairs within four or five years of the pievious repairs, does not the limit come in ?—The Superintending Engineer decides whether the matter should be sent up to Government.
  - 26. Q. Cau you say what your present annual exponditure is on second class tanks?—Our present expenditure is Rs. 40,000 per year on all tanks. Previous to 1891 and 1892, we only spent money on tanks irrigating fifty neres

- or more. Since thea we have repaired all classes of tanks except "one-man" tanks.
- 27. Q. Did you prepare the estimate of Re. 133 lakbs or the repairs of tanks in this district?—No, the estifor the repairs of tanks in this district ?—No, the esti-mates, I believe, were propared for the Tank Commission.
- 28. Q. I suppose the estimate of 13½ lakes is required for improving and restoring the tanks quite independent of what you are now spending every year?—I would rather think it includes it.
- 29. Q. What is the total revenue from all tanks F—I cannot tell you for the tanks irrigating under fifty acres. There are 473 second class irrigation works, the revenue of which is Rs. 1,75,000.
  - 30. Q. These Irrigate over fifty acres !-- Yce.
- S1. Q. And the revenue from each is about Rs. 400. Then there are about one thousand tanks, about which you know nothing. Supposing the average income of these to be about Rs. 200 each, the total revenue will amount to three or four lakes of rupees, and the proposal is to spend only four years' revonce in restoring them?—Yes, but you must always allow for petty repairs.
- 32 Q. That is a long way below the ten years' limit?—The ten years' limit does not apply so much for the big tanks; smaller tanks are the most difficult to repair nuder the ten years' limit.
- 38. Q. Are you engaged in working out any projects now? Yes, several for the repairs of small tanks.
- 34 Q. Havo you any other works under your charge, besides tanks?—liesides small tanks, I have the Dharma Canal, which feeds several tanks.
- 35. Q. Are you working up any proposals for new irrigation works?—No, I have not investigated the projects mentioned in Mr. Beale's report.
- 36. Q. (Mr. Ibbetson.) Speaking about the repairs 36. 4. (Alt. Lobetson.) Speaking about the repairs of there tanks, you say a certain amount of surroying is necessary. We were told the other day that a school box could do all the surroying necessary on a sheet of notepaper; probably that was intended to be an exaggeration; but is it anywhere near correctness?—For tank repairs, a sorveyor leveller is required on Rs. 40 to Rs. 80 per month. mont b.
- 37. Q He could not work out the project?--Yes; the project might be worked out by him.
- 38. Q. He could not settle the question of the waste welr? No; the Executive Engineer would have to see to the waste well and outlets.
- 39. Q. (Mr. Muir-Mackenzie.) Does the addition of a waste weir considerably improve the capacity of a tack?—The capacity is haproved a little if the waste-welr is raised. The work is done chiefly to prevent the tank from breaching.
- 40. Q. It does help it to irrigate more land?-No; not unless we mise the water-supply level.
- 41. Q You don't try to raise the area irrigated Pare not supposed to increase the area of irrigation without the sauctura of Government.
- 43. Q. Did you find many of the tanks breached f-No; not many ure breached. I found une breached which the Poblic Works Department had monded three years ago. The breach was not reported, and the tank had never held water sluce.
- 43. Q. Why was the matter not reported to the Collector?—I asked the Patel why be had not done so; and be said that it was because he was a now man. I ordered the repairs to be done at coce, but I have to send in an estimate for it, though it would cost less than Rs. 100.
- 41. Q Would it be worth repairing all the tanks ?—
  No; some do not fill, and it would not be possible to raise
  the supply level.
  45. Q. The principal fault of these tanks is, I understand, that they silt up.—I don't think so. It is bad in
  the upper catchments, much less further down. A small
  raising of the supply level remedies that.
- 40. Q. Does it not submerge land which the people do not like to see submerged?—The extra flooding is not very important.
- 47. Q. Could the inercase of allt be prevented by annual operations by the people?—The ailt cannot profitably be cleared. It is much better to raise the supply
- 48 Q. Is there any scope for new small tanks !- No, not in the areas I have visited.

WITNESS No. 86 .- MR. W. L. CAMERON, Superintending Engineer, Southern Dirision.

Answers to pritned questions.

1. The districts to which the following answers refer sre those of the Scathern Division, above Ghots, viz., Satara, Belgaum, Dharwar, and Bijapur.

I, now have administrative charge of the Public Worka, in the Southern Dirision.

- 2. A statement—Appendix A—is attached showing the minfall at the head-quarter stations of the above districts—for each month during the last ten years.
  - 3. There is no obstacle to the extension of irrigation arising from-
    - (1) Sparsity of population;
    - (2) Insufficient supply of catalo;
    - (7) . Fear of onhanced rent of rerenne assessment;
    - (S) Uncertainty of tenure or defects of the tenancy law;

unr is (3) want of manure a bor to a moderate extension of irrigation. The quantity of manure is, however, in most parts limited, and an rapid increase is possible in the more highly irrigated crops such as sagarcane.

- (4) There are large tracts of black soil which cannot be irrigated, but there are large areas of snitable land under commond of irrigation works which are capable of being, but are not ordinarily, irrigated.
- (5) In years of scarcity on, I think, every work, scores of applications for water have to be refused owing to the probable insufficiency of supply, and water has to be given in rototion to those who have obtained permission to irrigote. Even undersuch of remissiones, however, people bog for water and offer to necept all risks themselves and to ask for no remissions in case of failure of crops. Such applications are, of course, disregarded, but they tend to show that people are willing to take any reasonable risk, and the thought that, in an ordinary year, the supply may be uncertain, does not deter them from asking for water.
- (6) Lack of capital, as far as I have been able to ascertain, is no chatacle to the extension of irrigation, except in the case of a crop such as sugaroane, which requires a heavy outloy in the purchase of minare.
- (9) As a rule, the people are coatent with the eraps grown naturally, and if the rains are good, the difference in raine between irrigated erops and those of the same kind grown in the rainfall does not appear to be safficiently great to cover the coat of the water supplied and other expeases incidental on irrigation.
- 6. The irrigated area is so small compared with the total area under cultivation that it in no way affects the agricultural labour market.
- 8. On the Gokak Canal in the Belgaum district, which passes through a somewhat dry tract of country, the cultivators are keenly alive to the advantages of irrigation, and all the water that can be spared for irrigation is utilized. Any extension of the system would be welcomed by the people. The total culturable area under command of the present length of canal is 17,027 acres, and as much as 10,508 acres or 60 per cent. of the whole was irrigated in 10,001-1001.

On what are known as Second Class Irrigation Works that is to say, those which are maintained and managed by the cultivators (in the Southern Division chiefly small tanks which contain a sufficient supply to keep the rice corps depending on there alire during breaks in the measurem, the rights to water are jealously gnarded. On these works a consolidated rate is charged, and the people are required to pay the assessment, whether they irrigate or not.

- 9. (1) and (2) In the Southern Division there are, as far as I know, no private canals as are to be found in Sind.
- (3) A statement (Appendix B) is attached giving the crop rates on the ranals in the Southern Division. The rate is charged on the actual area irrigated, which is measured up before the end of the season.

11. In the Decean and Sonthern Mahratta Country I have never heard of damage of any kind resulting from irrigation.

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- 12. (1) A statement (Appendix C) is appended showing the sources from which the canals in the Scuthern Division derire their supply.
- (2) Water is taken from the main or branch canal by means of oatlets which are often simple iron pipes fitted with wooden plugs.
- 15. The canal irrigation is not ordinarily supplemented by irrigation from wells, but wells are often found along the irrigated iract, and in years of searoity they are used to supplement canal water. In fact, when the area for which water applications are received exceeds that for which the supply suffices, preference would be given to those applicants who have wells in their land and whose crops, therefore, are practically certain not to fail.
- 17. (3) The water-rates peid on the canals in the Southern Dirision for various kinds of crops are shown in Appendix B. Payment is made on the octual area irricated.
  - (4) No payment is made in the form of royalty.
- 19. I have never seen or heard of any damage resolting from irrigatina in the Decean. The nature of the country is such that the water drains away without difficulty.
- 20. Provision is made for myintonance in estimates sauctioned annually. The average cost per aero irrigoted daring the year 1900-1901 is given in Appendix D.
- 22 I do not think cannis could be constructed by private persons in this part of the country. The original cost would be far too heavy and the profits far too small.
- 23. (1) All tanks are supplied with water brought down during the monsoon by the nales across which dams are thrown.
- (2) In most cases water is passed through an outlet into a canal which traverses the country and from which it is let out on to the irrigated louds through small outlets which are generally pipes fitted with wooden plugs. In the case of the Yerla river irrigation systom, water is let through outlets into the nah and picked up lower down by means of a masoury weir and theace along canal to the irrigated lands.
- (4) The area irrigated in 1900-1901 from the various tanks is shown in Appendix D.
- 26. Irrigation is not ordinorily supplemented by water from wells.
- 28. (1) and (2) No tanks are owned by prirate persons.
- (3) The water-rates which are paid on the area actually irrigated are shown in Appendix B.
- 30. On Government tanks provision is made for maintenance in outlimates sanctioned annually. The incidence of the cost of maintenance per sore irrigated in 1900-1901 is shown in Appendix D.
- 31. No tanks belong to prirate individuals. The second closs irrigation tanks are managed and unintained by the cultivators. These cultivators pay a consolidated assessment (for water and land combined) direct to Government.
- 82. I do not think private persons are in a position to construct irrigation tanks. It is doubtful if the realizations would pay such interest on the sum required for land compensation alone as private capitalists would look for.
- 33. The time has not yet come when the silting of tanks has caused much inconvenience. In the case of the Maini Tank, however, the bed has silted up to 14 feet above the outlet, the total accumulation of silt being estimated to he 29,824,660 cubic feet. It has already been faund nocessary to raise the dam and waste weir to compensate for the diminution of storage capacity. This tank was constructed as lately as 1873.

### INDIAN IRRIGATION COMMISSION:

### APPENDIX A.

# Statement showing the rainfall at the head-quarter stations of-

n.							<del></del>		Belgaus	n.						·	
02.		92				January.	February.	March.	April.	May.	June	July.	August.	September.	October.	November.	December.
						In. cts	In. ots.	In. cts.	In. ots.	In. cts.	In. ets.	In. cts.	In. ets.	In. cts.	In. ots.	In. ots.	In.
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	1891 1892 1893 1894 1895 1896 1807 1808 1809 1809		•	•	•	0 5	0 86	0 81 2 48 0 85  0 22 0 29 0 11	1 14 0 78 0 55 0 62 0 30 0 67 1 16 1 55 1 24 1 18	0 64 1 26 3 40 0 57 3 41 1 59 2 7 0 78 1 44 0 66	2 SS 7 92 8 7 2 28 2 37 2 3 8 90 8 24 2 35 8 97	0 70 3 91 2 47 1 61 4 27 1 95 1 91 1 68 0 24 4 50	1 8 1 40 1 8 1 21	2 21 5 13 5 57 10 47 14 88 1 13 8 2 7 38 10 59 1 34	1 76 8 94 7 72 3 0 2 98 0 11 5 26 6 72	0 84 1 97 1 66 0 1 1 6 1 60 2 95 0 41	0 3
	Average		•	•	•	. 0 8	0 41	0 79	0 91	1 61	3 86	2 33	3 41	6 67	4 17	1 25	0 1

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Statement showing the water-rates per acre in force during 1900-1901 on Irrigation Works in the Southern Division.

APPENDIX B.

		٠,		M	INUTES	OF	EV	IDEN	ce.								37
	e e e e e e e e e e e e e e e e e e e	Andreas Res	91				(a) From 15th June to 16th Feb-	(b) From 15th October to 15th	(c) From 15th June to 15th Octo- ber, or 15th July to end of Novem-	(d) From 15th October to 15th Feb-	runky.		The state of the s	(a) From Loth Inne to 16th October. (b) " 16th October to 16th Feb-	runy. (c) From 16th June to 16th October, or 16th July to end of November. (d) From 16th October to 16th Feb-	From 16th June to 16th Feb.	f From 15th October to 15th June.  *¶ From 15th Octobor to 15th Juna,  *¶ From 15th Octobor to 15th Juna,  *§ From 15th February to 15th True.
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	Class IV.	Monsoon dry.	2	Rs. n. p.	100	00	100				00	000	>	0 8 0	1 0 0	0 8 0	100
ATES.	Class III A.	Saperior Radi crops.	5	Rs. a. p.	•	:	: :				: :	::	:	:	:	:	:
, WATER-DATES.	Class III.	Four months.	IJ	Rs. a. p.	3 0 0	00	000	,			88	00	9 C	> <	ရက က <sup>(</sup>	) C	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
	Class II.	Eight monthe.	<b>-</b> 7	Rs. a. p.	0 0	00	22000	•			44000	00	o c	; «	20 00 20 00 20 00	<b>.</b>	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
	Class I.	Perennial.	ဗ		20	ର୍ଷ	ន				88	81	٥	25	77	22	14
-	Nomes of Works.		cs.	Canals.	Krishus Ganal	Rewari Canal	Gokak Canal, 1st Section, and Storage	10155		Tanks.	Uppor Man River Works	•	Muddlendi tonk	Dambal Tank	Medleri Tank	Madag Tank	Aspudi Tank
	ģ		н		11	22 85	8,				26	629	D <sub>R</sub>	gg	34	30	38

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#### APPENDIX C.

Statement showing the sources from which the Canals and Tanks in the Southern Dinision derine their supply.

suppiz	·		
Dietrict.	Canal and Tank.	Source of supply.	REMARKS.
Canols.			,
Satara .	Krishna Canal .	River Krishna	ļ. ·
	Rowadi do	Biver Waran and	ļ
	Chikhli do	itivor Nandni aad	
Betganm .	Gokak Canal .	River Ghatprabha and Storago Works	-
Tanks.		11 OLAG	l
Satara .	Upper Man River Worke Panglo	rainfall.	
	Irrigation Works		
	(Nahr Taak)	Wanga Nala and	
Bijapar .	Mnohknudi Tank .	Mnohkundi Nala	
Belganm .	Gadikeri Tank .	Rainfall.	Į
٠.	Gokak Canal, 1st Scotion, and Sto- rago Works.	Ghatpracha River.	
Dharwar .	Dambal Tank .	Rainfalt.	
	Medteri Tank .	Medleri Nala and	}
	Madag Tank .		1
	Asnudi Taak .	Ramfail.	l
	Mavinkop Tank .	Rainfall	

- 1. Q. (The President.) How long have you been Superintonding Engineer of the Southern Division?—For the last ten months.
- 2. Q. Where were you before that?—I was Executive Engineer, Nasik. I was re-called from leave for famine work. I was also for a short time in Kathiawar, and before that Executive Engineer of Dharwar in charge of rosds and buildings.
- 3. Q. You have had a good deal of experience of the Deccau altogether ? Yes, a fair experience.
- 4. Q. You ery, "As a rale, the people are content with the crops grown naturally; and if rains are good, the difference in velue between irrigated crops and those of the same kind grown on the rainfall does not appear to be sufficiently great to cover the cost of the water supplied and other expenses incidental on irrigation." Would it be worth lowering the irrigation rates: would it make any difference?—No; I do not think so.
- 5. Q. You say, "The canal irrigation is not ordinarily sapplemented by irrigation from wells, but wells are often found along the irrigated tract; and in years of scarcity they are need to supplement canal water?"—I was referring to Nasik.
- 6. Q. Where there are several wells, and an application is made for water, would you give preference to the man owning these wells or would you give it to the man who has no wells?—I would ordinarily give preference to men owning wells.
- 7. Q. On the Nira Canal, where a certain amount of water has to be conserved, the Irrigation Department supplies water up to a certain date; and the cultivators have to use their wells after that?—The system of stopping of water, at a certain date, and making people use wells after that, may be feasible in Poona and Khandesh, but not lore.
- 8. Q. Do you think that in some places such a process would kill came cultivation altogether?—No, I don't think it would; the people don't mind accepting a certain of risk.
- 9. Q. In Appendix D of your printed memorandnm there are some startling differences between cases of canol and tank irrigation. The highest average cost per acro irrigated under casals is for Chikali Canal Rs. 343; and the highest for tank is on the upper Man River works, where the average cost per acre irrigated is Rs. 2161?—On the Man River works heavy expenditure was incurred in constructing a berm, by famine labour, to the Pingli tank dam. On the Yerla River works, a large outlay was incurred in etrongthening, also by famine labour, the Nehr tank dam.

APPENDIX D.

Total Area irrigated and average cost per acre irrigated during 1900-1901.

Name of Work.	Area irrigated during the year.	Per acro irrigated.	Remarks.
Canals.	Acres.	Rs.	,
Krishaa Cannl	8,288 -717 537 10,508	1.59 3.21 . 3.43 0.80	
Tanks.		1	
Uppor Man River Works . Yerla River Irriga- tica Works .	- 883 3,551	2t-64 10-70	
Maini Tank Muchkundi Tank Gadikeri Tank	1,415 77 837* 238	2 07 3 67 0 01 3 42	
Dambal Tank	144° 106 827	2·18 6·15 1·66	Area oa which
Asundi Mavinkop	168 185° 540°	19·48 9 12 0·38	assessment ie tevled.

- 10. Q. I sappose the large cost per sere on the Asundi tank was due to the same cases?—Yes; to unusually heavy expenditure.
- heavy expenditure.

  11. Q. We have had very little information yet about the Satarn district. Mr. Beale in his report quotes the views of Mr. Atkins, Collector of Satara, who ears: "the Man talnka is most in need of protective irrigation, hut new schemes would interfere with the water-supply to the Mhasvad tank, which irrigates lands in Sholapur." Are there in Satara many likely places for Ghat storage?—Yes; I think there are places where very fine storage tanks might be made on the Koyna River, but no definite information is available.
- 12 Q. (Mr. Muir-Mackensie.) Would that be a part of the Krishna Canal scheme?—The Krishna Canal weir is some little distance obove the juaction of the Krishna and Koyna Rivers. I would like to see first of all whether we can bring the water above the weir from the Koyna River at a moderate cost.
- 13. Q. Is the Krishna Canal capable of extension?—Yes, the original project was for 35 miles; we can extend it by ten miles, which will bring 10,000 more acres under command.
- 14. Q. You are not certain about the levels of this Koyna soheme?—Tho last thing dono was that levels were ordered to be taken, but they have not been sent in yet.
- 15. Q. Where was the hund to be?—That was not settled, but somewhere near Halwak there would be a good eito. Tho sites further east might have better eatchments; but a large amount of land would be submerged, and as you go lower down, the land gete more valuable.
- 16 Q. What force is there in Mr. Atkine' remarks that the now schemes would interfere with the Mhaswad tank?— The Jeshi tank would cut off 140 square miles from the catchmeat area of the Mhasvad tank.
- 17. Q. This is one of the proposed tanks which would deprive the Mhasvad tank of its water-supply. It forms an important part of the Mhasvad basin?—Yos.
- 18. Q, Probably it might be a good plan to store water for the sake of the Mhasvad tank if it was certain to be utilized ?—The Mhasvad water may possibly be fully used later on. I cannot say how often the tank would have overflowed, as the dam began slipping, and the waste weir was eat down. The weir so ont down has overflowed several times. If it had not been cut down, I am not prepared to eay if water would have gone over.
  - 19. Q. Was the dam shaky?-It began to elip.
  - 20. Q. I suppose it has been all right since?-Yes.

- 21. Q. Is the tank in Sholapur or Satarn?—The bund and tank are in the Satora district.
- 22. Q. (The President)—The Kriehaa River is, I undertand, so mach below the level of the country that it is difficult to utilize it?—As you go down east, the fall of the Krishna River becomes smaller and empler. Above Karad the fall is, I think, only 2½ feet per mile, opposite Satara 4½ feet, but in Bijapur it is 6 to 12 inches per mile. There is not much to be expected from it. The banks are 20 to 40 feet high.
- 23. Q. Would you encourage bandharas on the Krishnof Is there any flat ground neor the river, or in the valley itself?—Bandharas on the Krishna might be made in the Satura district or just outside the limits of it. A large body of woter could be let out, but it would have to be a grant weir, 500 or 600 feet long.
  - 24: Q. What would be the height ?- 20 to 30 feet.
- 15. Q. That would make o fair size tank la the bed of the river?—Yos.
- 26. Q. Turning to Bijapur, that unbappy place, which callers a great deal from famine, what can be done for it in the way of irrigation?—One good thing would be the extension of the Gokak Canal. Personally I am interested in seeing that scheme carried out. It has a better chance in my opinion than any other canal in this part of the country. It travels along the left bank of the Ghatprabha country. It tinvels along the left bank of the Ghatprabha River, and a very large area will be brought under its command.
- 27. Q. What is the soil?—I have not seen the soil; hut it is soid to be black but not very heavy.
- 38. Q. Do you say, with certainty, that the people would take water?—I should say so. It is m arid tract; and I quite bolievo, with the experience of recent drought that the people would gladly toke the woter.
- 20. Q. Why is not more water taken on the Krishna?—On the Krishna Canal all the woter is atilized in irrigation and the only bar to the extension of Irrigation is the want of water in the river. If the supply were sufficient, 25 per cent. of the area under command would probably be irrigated
- 30. Q. Whot is it that limits the demond on the Krishna Canalt I sit want of water or want of intelligence on the part of the people?—In the ordinary years there is an water; last year we had had an appreciable increase, the figures jumping from 4,000 to 8,288 acres.
- 31. Q. You say the Koyna Canel from the Krishna might be too low: in that case what would you do with the water?—We could pick up water from the Koyna storage lower dawn on the Krishna, opposite Tasgaon, for exemple.
- 32. Q. I think Mr. FizeGibbons said that the Gokak Canal will carry 408 feet per second?—The raising of the weir of the Gokak Conal by shutters will only provide enough water for the mills.
- 33. Q. Is 458 feet per second the maximum available from the catchment?—No. This is the quantity that could probably be rafely stored. If the canal were increased in size, more water could be let out in the mensoon without increasing the storage.
- 34. Q. Do you think it is worth il, why stop at 458 feet per second, when you can get 900?—That would involve a very heavy expenditure.
- 35. Q. The extension of the Gokok Canal is estimated at 91 lokhs of rupoes ?—That is an enormous sum to be spent in one particular part of the country.
- 36. Q. We have had evidence that in Bijnpur people are not keen on water. Mr. Beale mokes some remarks on the Muchkundi tauk on page 801 of his reports; coming to Muchkundi tauk on page 301 of his reports; colang to this district, is there any chance of the Magad tonk extension being carried out. Have you gone into the question at oil?—The dom of the Magad tank is enormous; the pitching is of 3 feet oube blocks; and everything is on a gigantic scale. The original idea was that the water level would have been 100 feet higher than it is at present.
- 87. Q. What is the land under it like ?—It is cultivated land, ond the Mysore Government may refuse to part with the land that would be submerged if the waste weir were
- 38. Q. It streek me from Mr. Bealo's map that the canal winds obant; but never gets into the famine district?—Not much of the district is affected by famine, only 10 per cent. of the villagers came to relief works.

- 39. Q. If it amounts to a question of locking up water in a country which does not want it, wo ought to store it in the Madag, and let it feed the Tungabhadra Rivor, and become a Madras schems?—One of the projects proposed for the Tungabhadra is for a canal from Heerur to Bellory? A suitable site for a wair could ricabably he found near A suitable A suitable site for a weir could probably be found near Hearur but the canal from it would not benefit hinds in the Bombay Presidency.
- 40. Q. Are there any profitable Ghot projects?—No, I know of none in Dharwar. There is a place suitable for a tank at Meundi near the Dambal tank, where Mr. Shirbatti says the people are very anxious for irrigation.
- 41. Q. In parsgraph 33 of year memorandum you say:—"The time has not yet come when the silting of tanks has caused much inconveniouse. In the case of the tanks has caused mach inconvenience. In the case of the Maini tank, however, the bed has eilted up to 14 feet above the earlet, the total secumulation of sult being estimated to be 20,824,560 cubic feet. It has already been found necessary to raise the dam and waste weir to compensate for the diminution of eterage capacity. This tank was constructed as Intely as 1870." Is there some inherent difficulty about that tank ?—There is all black soil in the catchment and I have noticed that small village tonks in black soil get silted un muldly. black soil get silted up rapidly.
- 42. Q. Why does the black soil silt up more easily than any other?—In oultivated black soil the fields are bare of jungle and grass and silt is, therefore, more easily produced, when there is a wash down.
  - 43. Q. It is moved more easily ?- Yes.
- 41. Q As a matter of fact, is a black soil streem or fleed more muddy then other streams?—It looks extremely
- 45 Q Would you advocate the making of sluices as a precaation against silting ?—For big works like the Gokak Storage Works, I should strongly recommend large sluices.
- 46 Q. I suppose you do not believe that clearing silt from tanks out be carried out economically ?- No clearence of silt by lobour ena be economical.
- 47. Q. (Mr. Higham.)—With regard to the Satara district what proposals are there for increasing the storage of the Krishne?—There was a proposal for a tank at Ambayadi.
- Ambavadi.

  49. Q That has been abandened f—Yes. Then there was the Tarla scheme. General Goodfellow reported in 1869 ogainst the scheme which Colonel Le Mesurier had recommended in 1885. Colonel Le Mesurier, while drawing attention to the risks attending the construction of lofty oathen dams, reported in favour of the scheme which according to his figures would yield a revenae of 8½ per cent. an the direct outlay. In 1888 General Goodfellow reported strongly against the scheme, drawing attention to the remarks by Colonel Lo Mesurier that there was a great risk attending any dam over 50 to 60 feet high. The dom was to be an earthen one 95 feet high. He pointed out that the only fessible dam would be a masonry one and gave certain figures which showed that the profits under those circumstances would be very small. He also drew attention to the feet that the distance fram Tarla to the Khodshi weir would be 20 miles, so that there would he heavy loss from evaporation and absorption.
- 49. Q The estimate of the total less was 420 million cubic feet !--Yes.
- 50. Q. The Krishno Canal weir is in the bed of the river, is it not  $P\!-\!Y\!es$  ,
- 61. Q What happened after that, was the work commoned?—No work was done. In 1895 Mr. Stronge reported that it would be better to give up the Tarlu scheme and build a series of weirs above Khodehi in the chape of bridges with openings of 30 or 40 feet spau with baulks or gates in the openings through which water could be gradually let down the Kriehna. One site is ot Mabuli, nuether of Gajegaon, and another at Bharampuri. The weirs were to be built at the rapids so as to make use of the fall which is about 10 feet.
- 52. Q. Could you get the water away from there ?-Bharampuri there is room for a small canal on the right
- 53. Q. The iden is to have a series of weils each storing a small quentity of water ?-Yes.
- 54. Q. What would be the aggregate storage ?-It has not been onloulated.
- 55. Q. Where would the water be utilized?-In the Krishna Canal.

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- 50. Q. How much would this storage increase the Krishna Canal supply?—The quantity has not heen calculated. It will not exceed one thousand million enbic feet.
  - 57. Q. Is that all you-want?-Yes, that would be ample.
- 58. Q. What cauld you do with that ?—We could extend to present canal by tea miles. With plenty of storage, we the present canal by ten miles. We could have n long left bank canal.
- 59. Q. Is that the only proposal put forward so far ?
- 60. Q. Is there any chance of a canal, taking off the Krishna, going out to the Athai talnka?—It would have to he very long; and we might not get enough of water for it 61. Q. Has it ever been surreyed?—No, it would have to he a very long canal and very expensive owing, to the large inasonry works that would be necessary, as it would have to he carried right across the tributaries of the Krisban.
- 62. Q. And you would aslo require heavy storage works to get the water, the anly storage project so far being that proposed by Mr. Strange?—There is one for the Koyna. The Kayna is a large river with a catchment in the Ghats. It would be practically certain to fill.
- 63. Q. Have they ony plans of that?—The Executive Eaglacer reported that levels were being taken, but femine came upon us and no progress was made.
- 64 Q. Are, there any sites?—I am certain that sites can be found on the Koyna.
- 65. Q. Has the Tarla scheme been shelved !- Yes, it has practically been ahandoned.
- 66. Q. Is there any other project you would like to recommend being completed for the Satora district apart from those !-No.
- 67. Q. Can any of these works he begun as famine works?—The works an the Krishna world he masonry which is unsuited for famine labour. Part of the dam for a storage tank on the Koyna might be of earth on which famine labour could be employed.
- 68. Q. How far has the Goragnoa tank progressed?— The puddle trench has been excavated, and the subsoil known locally as "Shadu" (a material which chemical analyzer has shown to contain 4 per cent. of salt) has been removed and the excavation partly filled in.
- 69. Q Only a small sum has been spent, compared to the cost. The total expenditure of the September last was Rs. 1,85,000?—That is famine expenditure; the normal expenditure would be Rs. 1,50,000.
- 70. Q. In regard to Sangegl and Hullur, what is proposed?—Large storage tanks are to be formed from which water is to be let out for irrigation. With the experience of Bijapur, I do not recommend the Sangegi tank. The people do not appear to be desirous of irrigatio, and 6,000 acres would be and the sangegi tank to the olinose of supplying water to another area. It is a serious thing to permanently throw out of cultivation a large area of land when there is no waste land to give out in exchange. in exchange.
- 71. Q. The Collector of Bijapur has recommended that the work should be campleted ?—I believe the Collector has said that the soil on the two sides of the Krishna is very different and that, while on one side the people will not take water, on the other they will.
- 72. Q. Do you think it is doubtful, whether the people will take the water if they could get it P—I think it would be a very doubtful experiment. It would snhmerge 6,000 nersa, and there is no land to give in exchange except in forest lands.
- 73 Q. Similar conditions apply to Hullur!—Yes, but that is a smaller work.
- 74. Q. Have you ever considered the question of irrigating in the Kolhapur State?—No. It will have to be irrigated by the Krishna or one of its tributaries?—Yes, if we carry out the Koyna scheme for storage, and if it be seasible to construct a canal to irrigate laads in the Athui taluka of the Belganm district, the pick-up weir will be in Satara and the water will pass through Kolhapur.
- 75. Q. You were a long time in Sind?—Yos, I was ten years in Sind.
- 76. Q. In Sind the water is given to the cultivators to take us they please?—Yes.
  - 77. Q. There is no application accessary ?-No.
- 78. Q. Do you think that the present roles, in regard to application in this Presidency might be relaxed?—I

- don't see how they can he relaxed. It is different in Sind, where without irrigation there is no crop. Here there is irrigation to a small extent; and at times there is searcity of water, so that it is absolutely necessary for the irrigation officers to know what the demand is going to he. If the people were allowed to take water as they liked from the tank, all the water would be drawn off at once, and all the using, all the water would be drawn off nt oace, and nil the crops would perish for want of water, when required most. I have known during the finmine in Nasik, people come to me and begue to give them water, offering to pay, even, if the crop tailed. Bot, if I had complied with their request, their crops would have failed, and, in addition, the people whose applications had already been accepted would have suffered.
- 79. Q. But that would not apply to the monsoon ?—No, not when the whiter is running to waste; but applications are also necessary to check frauds. The rule is that all applications for measoon crops should be received before the 15th Jaly.
- 60 Q. Might it not be possible that a man might want water after that date, who had no intention of taking it before?—It would lie with the Executive Engineer to charge him double rate, if water were taken without permission, and if he had reason to believe that the man intended to try to avoid payment. The matter is left to the discretion of the Executive Engineer.
- 81. Q. When you make a rule that double rate is to be charged, the Canal Officer is likely to charge i. !—Yes, but the oultivaters are aware of the penalty.
- 82 Q. Is there any objection to in man's taking water in the moneon without application?—No, except for the choice of fraud.
- 83. Q. Would you peaalize them f—As for as I nm concerned, if the man had sent an application, I would not, when there is plenty nf water, penalize him. I would only penalize for attempts to coaceal irrigation.
- 84. Q. But what do your Executive Engineers generally do ?—Some Executive Engineers would penalize thom.
  - 85. Q. I suppose every body knows that rule? -Yes.
- SG. Q. Have you considered the question of irrigation in Knthiawnr ?-No; I was only in Kathiawar for three wecks.
- As regards the question of wells for sugarcane you say the people don't mind accepting a certain amonat of risk. Dayou mean that they don't take the trouble to make wells to cusure a great risk?—I mean oven without a well they grow sugarcane even when there might be some risk of the crops failing.
- 83. Q. Even, if they understood, the water would not be guaranteed?—Yes.
- 89. Q. If we refused to supply water, after a certain date, would not that deter them from growing cane?—On new eanals it might. They would begin caue-growing very slowly at first, and if they found the water falled, they would step planting sugarcane, and other people would be choked off.
- 90 Q. On the Rewari Canal, is the snpply porennial?—I think it generally flows all the year round.
- 91. Q. That is a small caual ?-Yes, it irrigates only
- 92. Q. You say that on second class irrigation works the cultivators jealously guard their rights. Do you think if water from first class works was parcelled out to the villagers as a whole, that they would be equal to controlling the distribution among thomselves?—I he villagers. I fear, could not control the water for first class works. On second class works the question which was in villagers. I fear, could not control the water for urst class works. On second class works the onstom which was in force a hundled years ago is in vogue, but on first class works the people under them would not know what to do
  - 93. Q. I suppose it has never been tried?—No.
- 94. Q. Snpposo you were to give each village water-course a definite supply every teu days and told them to divide it among themselves, would they not be able to do so?—That would mean changing the assessment to consolidated rates.
- 95. Q. Suppose you try it where you have crop rates? Where we have crop rates the areas irrigated are usually small and scattered—mere specks in the midst of unirrgated fields, and I do not think there could be any combination among the irrigators. But on the small second class irrigation tanks the case is different. All the land under them that can be irrigated is assessed at consolidated rates, and the owners are required to pay the assessment whether they

take woter or not, and consequently each man asserts his right to his share of the water.

- 96. Q. I would give the water out in blocks?-In ordinary years the people don't want weter for dry crops and they wen't take it.
- .97. Q. (Mr. Ibbetson.)—You say io parsgraph 3 of your memorandum that there are hirgo troots of black cottonsoil which cannot be irrigated, and that there are tracte that can be irrigated. You don't mean that all cannot be irrigated ?-No, I was thinking of Belgaum and Dhorwar.
- 98. Q. Outside Belgaum and Dharwar do yea know of any soil that caouct be irrigated ?-The anirrigable tracts of black soil ore those to which we cannot give water.
- 99. Q. But would the truets you refer to take water if they could get it?—In the Bijapur district in the part near Bigalkote they would take water I think.
- 100. Q. Are there any other parts in Bliapar where you think water might be token? -I dee't know about the other paris.
- 101.. Q. De you know what conditions determine whother water is taken or not ?—It is perhaps a question of soil.
- 102. Q. Yon say in a famine year the water in all the tanks is less than the domand, but that in ordinary years all the water is not taken owing to the uncertainty of the supply. If the supply were assured, it is said they would take water for high class crops. Do you believe that !—I don't hold those views. The area under high class crops must be limited, and it is only in years of scarcity when the people can see that there is less water in the tank than usual that they cleaner for water. they olamour for water.
- 103. Q. I don't think I have made my point clear. If you could guarantee the supply throughout the season and for every year, near might be induced to go in for high class crops which alone makes irrigation possible in on ordinary year?—I don't think that any doubts about the water-supply prevent people from preparing their lands for high class
- 101. Q. Then you don't think that changing a precarious iato a perconial sepply would lead lo a great increase of irrigation in ordinary years ?-No.
- 105. Q. That irrigation has increased during the last two or three years is natural, but is there any reason to believe that the increase will be maintained in ordinary years?—I think not. For instance, in 1808-09 the irrigalion on the Krishaa tank dropped to the old figures.
- 106. Q. On the Gokak Canal tha people use every drop of waler they can get?—On the Gokak Canal the people have realized the advanlages of irrigation. In other parts in ordinary years crops de well without irrigation.
- 107. Q. The supply is peronnial, but that does not explain the difference of demand on the other canals?—No.
- 103. Q. Aboat sapplemental wells, when a man grows sugarcane under a canal the area is limited by the water in the canal; with well water if he could irrigate his erop throughout the year, is it not a waste of water to give him canal water when he can irrigate from his wells?—The cases I refer to are in the Nasik district, where the wells ore silted up and the people take canal water.
- 109. Q. If the demand is equal to the supply is it not better to give water to the man who has not get a well?— I don't think we ought to penalise a man who has sunk his capital lu a well.
- 110. Q. You don't penalise him. You let him have his well water and give caual water to a man observers who has not got any water?—I would give it to the man who had a well.
- 111. Q. Why exerified protection to the interests of the man who has a well?—If the water in the canal is at all liable to fail, I think that the man with the well should be given the preference.
- 112. Q Suppose you had two applicants, one who had a woll and another who had not; would you not refuse the man who had the well and give it to the man who had not?

  —In the case of on ample water-supply I should still give the preference to the man with the well.
- 113. Q. Taking the Nasik case if you had an ample water-supply would you give it to the man with the well?
- 114. Q. Referring to famine programmes we find in Bijapur they have been living from hand le month. You have the districts Belgaum and Dharwar in which famine

has not been very frequent, have you famine programmes ready for these two districts?—Yss.

- 115. Q. How were those prepared, who was consulted?— The Collector consults with the Executive Engineer and sends in the programmee for the approval of the Commissioner and Superiotending Engineer.
- 116. Q. Are current Public Works Deportment works included. That is supposing you were going to make a new read presently, you would not put that in the famine programme?—Current works are not included in the famine programms unless they are works which are not likely to be carried out at once from ordinary funds.
- 117. Q. As a matter of fact they are not included ?-
- 118. Q. There is nothing to show how you arrive at the numbers of noskilled famine lahenrers?—We calcolate the probable numbers likely to go on relief works by previous famines.
- 119. Q. When you have the actual figures of a severe and recent famine, don't you think the actuals should be included in your slatement?—Yes, I think the actual figures of the last famine should be shown on the lamine relief works programme which provides for six months. .
- 120. Q. Have you a map showing these works ?-Yes one was sent to the Collector.
- 121. Q. In the case of large works on the borders of the district which would probably attract labour from the neighbouring districts, do you make any allowance for that ?-No, we make no allowance for immigrants.
- 122. Q. Is there a separate list for Clvil Ageocy Works?
  -- Yes, the Collector propares that.
- 123. Q. Sopposing the Collector puts down repairs to tanks, is there unything to ensure that the best possible work has been selected?—As a rule the repairs to tanks are generally clearance of drinking lanks.
- 124. Q. Is no survey or projects required for these?-
- 125. Q. Are there no works of that sort in your programmes?—No. On works such as field embankments some levelling is necessary.
- 120. Q. Are there any siles in your district whore new irrigation tanks could be made prefitably ?—There are sites possibly for small tanks to impound water.
- 127. Q. Could not money be profitably spent on such works? Yes. I think so.
- 128. Q. You have not been consulted as to the list of Civil Works?-No.
- 120. C. Would it not be better if both liste passed through your hands?—They do pass through my hands. But it is difficult for me to give an epinion as to what small works should be taken in hand.
  - 130. Q. You have not had a survey made ?- No.
- 131. Q. Would it cost much P—It would require n very large establishment for a general survey and would take a great many years to complete.
- 182. Q. Could you examine certain sites only ?—It would take a much smaller establishment if the Momlatdars could tell os first what tanks require repairs.
- 133. Q. De you think their information would be counted much F-Yes.
- 184. Q. Could you safely leave it in their hands P-Yes, they could be trusted to de this.
- 135 Q. As regards the larger works entered in the list, are the projects ready ?—No, many of the projects are not
- 136. Q And so if famloe came, you would be unprepared to some extent f—Yes.
- 157. Q. Could you get these projects ready in the ordinary course during the last 18 months with any extra establishment?—Yes.
- 138. Q. (Mr. Rajaratna Matr.) You said that under existing circumstances it is impossible to abelish the application system; could you not make a sattlement with the cation system; could you not make a sectloment with the rayals for five years based on the average of the previous five years and repulate your supply accordingly, letting the villagers declde how much over each man will take up?—I don't think the Government would like the Executive Englacer to guarantee water for five years in advance. Bestder a man would say he did not know what crops he was going le grew in the next five years.

Mr.

13 Jan. 02.

Mr. Cameron.

- 139. Q. You will still charge crop rates but fix the area and guarantee the supply?—I don't think it will work.
- 13 Jnn. 02.

  140. Q. You say to each rayat you bave been irrigating 3 aeres of gardon crop and sugarcans, we will make a permanent mrangement to anpply you with water and charge you necordingly?—It would be a long process, if we had to coosult each landowner.
  - 141. Q. You have to do that now every year, under the present canal system?—No, we do not ask them; they apply to us.
  - 142. Q. Mr. Visvesvaraya has made some such proposal. You take the water in the tank in the worst famine year as a beets and gnorantee one-third of the supply; would you care to try that in the Gokak Canal?—At Gokak the people are only too eager for water, so that I don't understood what the object of thet would he.
  - 148. Q. You practically introduce n consolidated rate. You got a fixed rovenue and all hother about applications is abelished. I am speaking of causis of unlimited supply?—The Gokak Canal supply can fail. It did so in 1900 for seven weeks.
  - 144. Q. How does the system of application onable you to provent frauds?—The canal authority reports the date of the first watering.
  - 145. Q. If the application was not put iu, and the Canal Ollicor was giving water?—The frand would be detected by the supervisor; and there is a ponalty for taking water without leave.
  - 146. Q. Then you don't think that application chenld be abolished?—No. I don't think that the application on the printed form deters people from taking water.
  - 147. Q. Mr. Whiting told us that the Patkaris often favour jeople?—I have not come across each instances; but I don't mean to say that the casal establishment is immendate.
  - 143. Q. With regard to supplemental wells, in connection with tanks of uncertain supply, do you think that if the canal rates were reduced by 1, in regard to those people who had wells, would the number of wells increase?—I do not know; but we might reduce the rates on the condition that a well would be sunk.
  - 149. Q. If additional takavi were granted, would the rayats be induced to sink copplemental wells f—Yes; I think they would.
  - 150. Q. The Deputy Collector has told us that, if the Gokuk Canal could be carried across a certain na'la, it would irrigate a large area of dry land?—Yes, an enormous area.
  - 151. Q. Whot would be the cost of that work?—I cannot toll you what the cost of nu aquednet over the Nallah would be, as I have not the figures with me here.
  - 152. Q. The Deputy Collector thought that people want water largely for the kharif crop?—In the mouseon we could give any amount of water.
  - 153. Q. It could be carried out without waiting for the big scheme?—It will be investigated ehertly; hut, I believe, that it can be carried out without waiting for the bigger scheme.
  - 154. Q. I believe the stream is two furlongs wide?—Four hundred and forty yards would represent a very wide stream; and the scheme will be very expensive.
  - 185. Q. Yon say that the wasto weir of the Mhaswad tank was lowered; to what extent did this reduce the capecity of the tank?—I have not got the papers here; they are in the Sholapur Divisional office. The dam showed signs of failing; and it was out down.
  - 156. Q. Is there any proposal to relse the weir to its former level?—Yes; this was merely a temporary arrangement.

- 157. Q. On the Krishos River, Is it possible to irrigate any large area, by means of oil engines or steam pumps f—That is a question I cannot mover off-hand; because of the cost of pumping. Whether the scheme is puncticable can only be determined after very careful investigation.
- 158. Q. (Mr. Muir-Mackenzie.)—Is it true the cultivators refers to use the water on account of the sacredness of the river; and that they will not take the water pumped, as it will be tonehed by profane bande?—I have not heard of that.
- 159. Q. (Mr. Rajaratna Mdlr)—Certain dotes no fixed for application; and we were told that water is not allowed for irrigation before that date?—Before the dates fixed, the rayats are not allowed to take water.
- 160. Q. If they asked water for two seasons, they will have to pny crop rates for two seasons?—Yes.
- 161. Q. Supposing a man applies for kharif crop early in January, you would not give him water before the 15th Juno?—No, certainly not, the hot weather supply is most volumble.
- 162. Q. What are the hot weather rates?—The ho weother rates are as follows:—

On seven works, Rs. 8 per nere.

On two works " 6 "

Ou three works ,, 4 ,,

- 163. Q. (Mr. Muir-Mackensie.)—The Pudkalkatti Canal would not go into the famine area f-No, only to the borders.
- 164. Q. Would it be advisable to slart the canol work, in anticipation of the tank heing made?—No, I would prefer to see the tank made first, as the causi would be useless without it.
- 165. Q. If you have the eanal complete, you, have only to etart the tonk?—I would rather put in the puddle trench first.
- 166. Q. But that would be further from the centre of labour?—It would. But I do not think the distance would be objectionally great.
- 167. Q. Yon have two sets of eight monthe' crops?—Yes, it depends on the time, at which the waler is taken. The first is up to the 16th January, and the eccond ect is up to the end of February.
- 168. Q. When must the applications for the first set be received !- Any time before the reason ends,
- 169. Q. By what date are you pledged for the eight months' crop?—At about the end of the moosoon.
- 170. Q. How for is the Irrigation Department pledged by the area under eight mentile' crops f—For the eight moeths' crops water is not pledged beyond Fohrnary.
- 171. Q. Is it pledged for a longer time for rabi crops?
- 172 Q. There are large pools of water in the Krishan, can they be ntilized P—No.
- 178. Q. Do you know any cites on the Warno River ?-
- 174 Q. I should like to see all these projects thoroughly investigated. You would not recommend the etoppage of the works on the Sangogi and Hullur tunks?—No; I think they are loss unprofitable than any alternative.
- 175. Q. Are you against the employment of famice labour on field emhaukmonts ?—No. But before they could be undertaken a complete scheme of these field cohemes would have to be got out. It then might be possible to make them in groups by famine lebour.

Witness No. 87,-Mr. H. F. BEALE, Superintending Engineer on Special Duty with the Irrigation Commission.

Mr. Bcale. 19 Jan. 02.

- Q., (The President.)—We are much chliged to you, Mr. Benle for the valuehole help you have given us; and for your carefully prepared report of irrigation works in the Bombay Presidency. It was a great pleasure to have ballyon associated in our investigations up to the borders of the Madrae Presidency.
- Mr. Beale.—It has been n great pleasure for me to have given such information as lay in my power; and I should like to add the following fow remarks:—

Repairs to 2nd class irrigation works, small tanks.

When the Poblic Works Department has repaired such to ake there should not be a recurrent annual charge for

meinleannee, because Gavernment have raled in Public Works Department G. R. No. 34 Wel—419 of 5th March 1895 that all petty repairs shall be carried out by the villagers. The petty repairs ore described as "filling in ratificles, making up banks worn down hy cattle troffic, closing smull water courses and similer petty earth work repairs," and the Revenue Department were directed to issue the necessary instructions in the matter to village officers and Circle Inspectors.

In practice, however, according to the Belgaum Executive Engineer's evidence, the petty repairs are often not done and the Revenue authorities cannot legally enforce

the carrying out of such repairs. Some legislation would, therefore, appear advisable, to secure a reasonable amount of care and attention being paid by the villagers to the uplant of the small teacher. keep of the small tanks.

### · B.—Bandharas in various districts.

There are numerous rakka bandharas in Khandesh and Nasik and it is stated (page 140 of the Roport for Bombay) that these were constructed and maintained by the Mahomedan Government. Before their construction there were undoubtedly temporary bundhams in their places.

The Bombay Administration Report, 1890-1900, shows that the "other sources" (besides wells and tanks) from Which water is drawn for irrigation are as follows:—

	Collectorate.			Pakka.	Kacha.
	Khandesh Nasik		."	. 70 . 234	37 244
				301	281
1	Ahmedungar Poona Satara	•	:	20 74 70	471 388 5,201

The proportion between pakka and kacha works of this Mr. Beale. kind may perhaps be due to the Mahomodau influence having been less strong in the latter districts, and partly also to some difficulty with foundations. But it is probable that in a large number of cases a masonry structure could be substituted for the temporary dams which are erceted annually at a cost of Rs. 50 to Rs. 100, and that the area of irrigation could thereby he improved and extended.

### C .- Irrigation of high class crops.

I have advocated in the report the encouragement of high class crops under irrigation works: but where it is not high class crops under irrigation works: but where it is not possible to increase the water-supply to a, canal, by fresh storage reservoirs, I would not recommend the encouragement of such crops to the exclusion of grain and fedder crops. It would, I think be advisable to give water to a "permanent" area of rabi irrigation, that is: to ascortein how much the cultivators will Irrigate from year to year, and let this be a first charge on the water. The remainder might be wholly given to perennial and garden crops up to the limit of the assured annual storage. Any excess of water in good years could be made use of as required. By this means a more or less certain area of irrigation might be secured, and the annual variations (except in the case of tanks with very uncertain supply) should be comparatively small. amall.

### Supplementary Memoranda, etc.

# (1) Mr. D. W. Hernert, Assoc. M. Inst. C.E., Under Secretary to Government, Public Works Department.

Answers to printed questions.

Mr. D. W. Herbert.

Proliminary Remarks.—I served as Executivo Engineer, Khaudesh district, throughout the Tamino of 1899-1900, but have never been in charge of irrigation works except in Sind, and am therefore not in a position to give much useful evidence.

5. Provincial Irrigation Works.—All the irrigation works in the Bombay Presidency, with the exception of the Gokak Storage Works, are financed from Imperial funds. The question of provincializing these works has several times been considered and abandoned. As land revenue is mainly Imperial, it would appear to be appropriate that the expenditure on works, which so greetly affects it, should also be Imperial.

It is believed that the majority of the large irrigation works in the Decean were constructed either for the purpose of relieving famine or as protective works, and the financial responsibility, for these and for completing the irrigation works commenced as founder relief works, could not, I presume, be undertaken by the Local Government under existing financial arrangements.

7. Wells.—Apparently the difficulty of obtaining fedder for the exen interfered in Khindesh to a certain extent with the usefulness of wells for irrigation purposes during 1900.

10. Programmes of Relief Works.—I would recommend, for the Hombity Presidency, that an Executive Engineer with three Assistants and about twenty subordinates be appointed for the purpose of getting up projects for famine

relief works. The above establishment would probably be able to complete a twelve mouths' programme in about two years at a cost of about one and-a-quarter lakks per annum. After the completion of a twelve mouths' programme, the number of assistants and subordinates night be reduced and a further reduction might be made after the completion of a two years' programme. The remaining establishment would be permanently employed for the purpose of maintaining the programmes, revising estimates, inspecting bench marks, rain ganges, tools, etc., and as a reserve in the event of a ismine. The Executive Engineer might also prepare a famine maunal including complete task tables and ready reckeners; he would, in districts where that difficulty is met with, propare a list of the places where water is obtainable in years of drought near the proposed works. He would arrange for the supply and distribution of a reserve of tools, and would carefully prepare and keep up to open of a famine.

Rhandesh was considered practically immuno from famine, and all the arrangomouts, programme, establishment, tools, etc., were sufficient, before the famine, for about a tenth only of the number that had to be relieved. Anyone who has experienced similar difficulties would be satisfied of the necessity for some such arrangement as proposed above, especially in the Bombay Presidency, where the Public Works Department establishment is short of requirements oven in normal times.

## (2) Mr. H. S. Lawrence, I.C.S., Acting Director of Laud Records and Agriculture.

#### MEMORANDUM.

1. The points upon which information is required are detailed in Government Momorandum No. P.-1053, dated 21st September 1901, and the appendix to Government Resolution No. 2275, dated 26th October 1901, and are referred to in the margin of this report.

2. It will be convenient to separate the districts not merely into Gujarat and Deccau, but as shown nuder, into-

Gujarit," Karnatak Konkan. Deccau. Khándesh. Belganm. Thina. Alimedobad. Lijapur. Kaira. Panoh Mahals. Kolúba. Nasik. Aluneduagar. Dhárwár. Rotnhgiri. Poona. Broach. Kaoara. Sholapur, Surat. Sátára.

3. Up to 1985-1886, irrigated areas were shown under The existing state and progress the general heading "Irdaring the last 30 years or period for signted garden lands on which information is available, of tanks, water-courses, otc." irrigation by smaller lanks, dams, water-courses, otc. "From 1885-86 tn 1892-93 miror works of irrigation.

Channels, well of rightion. They were divided under Gevernment Memorandam No. P. the headings "Canals" 1053.

From 1892-1893 the following sub-division has been made:—

(1) Government canals, (2) private eanals, (3) wells, (4) tanks, and (5) other sources.

This classification is, however, only approximately correct, as when an area is irrigated partly from wells and partly from tanks and canals, it is entored under the head which is the principal source of irrigation.

Table I gives the information available from 1892-88, and an abstract according to agricultural divisions is odded in Table II.

Attention is invited to (1), the failure of tank irrigation in 1899-1900, which in Gujarat fell from 14,182 acres in 1898-99 to 693 acres, and in the Karastak from 92,355 to 24,480 nores.

(2) The large expansion of well-irrigation, especially in Gujarát, from 93,601 in 1808-99 to 183,216 acres in 1899-1900.

It is to be observed that in 1896-97 the rainfall, though so unseasonable as to cause famine, was not below the average throughout the country, while in 1899-1900 it was

exceedingly deficient. In consequence there was a sufficient supply of water for the Government canals, tanks, and phits in the first year, but in the second, when the need for protection was still more urgent, these sources proved ineffective. The figures strikingly illustrate the superior value of wells as the most reliable method of protection.

4. The gross and culturable areas in each district and the proportions of the latter which are protected by Government irrigation the proportion of irrigated areas to culturable areas.

Trigation Commission Memorandum, paracraph 2 (1).

Gross and culturable areas and the proportion of irrigated areas to culturable areas.

Lago works and by wells respectively, are entered in Table III.

5. The character of the soil in the various tracts is fully Irrigation Commission Memorandam, paragraphs (1). Character of the soil.

31 of Mr. Mollison's Text Book on Indian Agriculture, Vol. I.

In briof, in Gujarat the seil varies from sand, in Ahmedabad through alluvial leams, in Kaira to the black clay leam of Breach and Surat.

In the Decean the ralloys contain "medium black soil of moderate depth with murnm or trap as the underlying stratum;" the uplands have thin soil of disintegrated trap.

The Karndtak has clay leams of great natural fortility.

The Konkan has stiff ferruginens clays for rice, light sands for gardous, and poor stony uplands for dry-crops.

6. Nowhere is cultivation solely dependent on artificial irrigation Commission Memoran. irrigation. In all cases dum, paragraph 2 (3). Dependence such irrigation is in aid of natural rainfall used for the production of more valuable crops.

7. Statistics for ten years as recorded at the head-quarter Indigation Commission Memoran stations of districts are dam, jurgaraph 2 (4). Hainfall. ontered in Table IV. Pages 3 and 4 of the Statistical Atlas of the Presidency, may also be consulted.

Trigation Commission Memoraudum, paragraph 2 (6) and (0). Is there ordinarily a demand for mater in Cultarit during south-west memoon? What are the crops which require irrigation, etc.?

8. No exact information on record.

Mr. H. S. Lawrence. Dhekudis or Bud-

C. Tonks. D. Canals and chan-

Mr. H. S. Lawrence.

No control is exercised by Government agency over No control is exercised by distribution from private dam, paragraph 2 (7). How is the distribution controlled?

No control is exercised by distribution from private or villago works. Irrigation from Government

cannts is controlled by the Irrigation Branch of the Public Works Department.

Irrigation from the dam, pringraph 2 (6). In west form a firmination resease realized?

Complete information should also be complete information should also be complete information who all also be complete information or limited as a limited from the complete information or limited as a limited from the complete information or limited from the complete information or limited from the complete information and the comple

on irrigation revenue realized?

Complete information should also be collated regarding the assessment and rates on all irrigated and irrigable erops and lands including rice, the principles and incidence of substitution and an arrangement about the explained.

Gorerament Memorandum No P.,

A. The system of ascessment on wells was handed down from the Maratha rule, and having been from the earliest days of British rule recognised as a tax on improvements effected by the mynt has been gradually transformed or abolished.

No additional charge whatever is imposed on the construction of a new nell.

The system under which the land nesessments now in larce were imposed ratios in different tracts.

In dry and arid districts of the Decean (such as Iu-dunar and Madha) lands found under irrigation from wells at the original scittement and then assessed on garden land were assessed within the maximum dry-crop

Lands under new wells, that is, these constructed during the original settlement, were as cosed at the ordinary diy-

In the districts of the Decean and Southern Maratha Country with greater command of subsoil water and where well hirigation was found to have been carried on on on extensive scale, lands with wells, whether old or new, that is, whether existing from a date anterior to the introduction of the original sottlement or constructed since, were

classed a little higher an account of command of water and nesessed at day-crop rates, the asso-maent in no case exceeding the noll assessment previously levied.

Act IV of 1886 amending the Land Revenue Coda laid down (Section 10.1) that when a general classification of the soil had been mode a second time, or any original classification had been approved by Government as final, no future change of classification should be made. This now covers all cases; the Surres Department has been abolished, and the utilisation of water advantages is entirely free from any risk of fature enhancement.

10. In the Gujarat districts a subseil water rate was substituted for all assessments on wells, in accordance with the fullowing survey rule :-

Where in any tract in a viltage which is well defined and of uniform character of sait, the subsoil water is shown by that of the wells existing in it to be of uniform quality, every survey number in theirrost, though as yet without a well, shall have its subsoil water classed in the same order as that of the survey numbers which have wells."

No addition was made by this subsoil assessment to the total receive demand of a village, but when that domaind had been determined on general considerations, the subsoli-nessesment merely increased the share of the total demand imposed on those fields which possessed superior irrigational potentialities.

When the asses ment of a field had been calculated When the assessment of a field had been calculated according to the mothed of soil classification penuliar to the Bombay system, a percentage was added which varied according to three factors—the factility of the soil to be irrigated, the depth at which unter was obtainable, and the quality of the water. The percentage varied accordingly from 2 per cent, to 50 per cent. It is impossible to acceptain the incidence of this sub-oil water assessment in all cases, but from the ligarest entered in the subjoined statement, it appears that in representative thinks of the Kaim and Surat districts it amounted to from 3 to 7 per cent, of the ordinary assessment. the ordinary assessment.

					Aai	А.	Aerro	HEXT,	Pance	itage,
Distr	let nod 1	lilats.			of dry-erop and the last	Under soboill no-ctument.	Of level dry- stop and the fault.	On arround of onrock adrautegre.	Of subwill area lenionen 3), on total area testemn 3).	Of school are samed foolung \$1,000 total are retail {c.lumi}.
	1			_	3	3	4	f	8	7
	Kain	J.		   	Acres.	Acres.	Re.	R«.		
1. Mehmadal	sd			• }	\$1,700	\$9,576	2,23,510	11,001	03-7	2.3
2. Anand	•				61,172	17,096	3,01 530	13,360	29:4	4.1
3. Kapadran	j .		,	•	80,276	41,075	1,48,150	10,841	52-2	7:3
4. Thagra	•			,	69,168	18,401	2,05,786	5,910	26.8	2.8
5. Borrad					49,628	26,317	2,71,500	17,052	53-09	6-5
		T	otal	•	311,939	153,198	11,53,552	50,070	49-1	<u>5·1</u>
	Scra	T,				1				
1. Chorasi				•	26,264	1 3,913	1,61,925	4,317	15:01	2.6
2. Chikbli	•	•	•		81,753	10.112	2,13,590	6,211	12-3	5.5
3. Օിթնն	,	•			101,615	648	5,06,765	511	0.78	0.1
4. Bárdoli	•		•		116,116	9,560	4,65,690	6,059	8.2	1:3
5. Jalálporo					59,576	13,113	3,14,201	14,020	21.0	4.4
6. Bulsar	•		•		97.398	13,436	2,57,012	11,340	13.7	44
		1	otal		493,055	50,001	19,19,191	42,518	. 10%	2.2
	Gea:	id <b>T</b> o	TAL		791,991	201,162	30.72,742-	1,01,597	25.7	3.3

11B. Dhekudi or Budki is a pit or well in the bank of a river, nala or tank connected therewith by a channel.

In the Decean and Southern Maratha Country since 1874 "lands within a certain distance from a stream from which water could be obtained by means of a budki were classed at a higher rate and assessed at a rate not exceeding the maximum dry-crop rate in the garden had existing at the time of the last settlement and at the simple dry-crop rate on the land under wells or budkis constructed since that settlement.

In the Gujarat districts of Panch Mahols, Ahmednhad and Knirn, subroil water assessment has been substituted for the special rates formerly obtaining.

In Surnt where the rivers do not change their course, and dhekudis can, therefore, se unde permunent, a percenting addition is unde to the accessment of fields within 30 chains of the etream, this addition varying according to the depth to water in the dhekudi, and the percential or seasonal supply of water.

12C. Tanke,-Irrigation from tanks takes place on a and seed, except only in the District of the Karastak, where in 1898-90 some 82,000 acres received it (ride Table I). The assistance derived is included in the classification value of each field, so many annas for comwand of irrigation being added to so many annas for soil fertility, and a consolidated rate is imposed accordingly.

18D. Canals and channels.—Patasthal assersment is fully treated in a note by Mr. Ozanne, late Surrey Commissioner, printed as an Appendix to Government Resolution No. 712 of 28th January 1897, on which the following summary is based :-

"Under the existing law there are three different forms, Three different ways of charging in any one of which rates for the use of water, right to which verts in Government, are chargeable, viz.:

- (a) By the Irrigation department under the provisions of the Irrigation Act, provided no rate is charged under either section 55 or section 101 of the Land Revenue Code.
- (d) By the Collector under the provisions of section up, provided no rate is charged under either the Irrigation Act or Section 101.
- (c) By the Survey Department under section 101' Land Revenue Code, provided no rate is charged under either the Irrigation Act or section 55 of the Land Berenvo Code.

"The Irrigation Department leries the water rate in the Irrication Department system; of form of a crop rate, rating. Crops the amount of water required, and the charge is taken in full only when a full supply is given.

"The rates charged under section 55 are also generally Raicrehared under section as of in the form of crop rate. Land thereare Code.

These rates have always been treated as temporary and lasting till the imposition of a Ragait assessment under section 101, or, if the water is supplied from works constructed and maintained by the

Irrigation Department, the imposition of rates under the Mr. H. S. Irrigation Act.

"The assessment fixed under section 101 forms an integ-"The assessment fixed under section 101 forms an integ-Fiche the pitaethal area and its ral part of the ordinary sassament. In a revenue and is in-oluded in the guarantee given at the time of settlement. It is fixed on an average and is leviable irrespectively of the actual water-supply available in any one year and irre-spectively also of the actual are made by the rayat who is at liberty to irrigate any part of his field whether less or more than the area assessed as parasthal garden, for this is not a definite demarcated area, but an average area according to the judgment of the survey officer." the judgment of the survey officer.

The latter survey assertment is a consolidated soil and water rate assessed according to the quality of the soil and the ordinary permanence of the water-supply.

Irrigation Commission Memorau-dum, paragraphs 3, 4 and 5.

14. No exact information on record.

Paragraph 6 (t) and (2).

By whom district or sillage works are constructed and controlled? humber of such works and agengate extent of cultivation dependent on them.

15. District or village works are represented by tanks. They were constructed for the most part originally by former rulers; the statistics (vide Table V) show ma increase of 27 per cont. in their number from 8,748 to

their number from 8,748 to 11.115 between 1886-87 and 1896-97, but this is probably due to imperfect classification of tanks in Kanara, which irrigate half an acre apiece, having been reported to have increased by 1,500 or 50 per cent. In Belgaum also there was an increase from 445 to 559, and in Ahmednagur a decrease from 135 to 6. The causes of these variations are not on record in this office, but outputy is being made.

In the Karnatak a considerable number were constructed and are controlled by private owners. The more important table are controlled by the Public Works Department which repairs them.

The average arreage injigated was 102 acres; this average is the result of figures so divergent as in Breach, Khamlesh and Kangra one-half an nore, and in Panch Mahale and Bijapur 105 and 107 acres per tank.

16. The responsibilities of Government in regard to their

lerigation Commission Memoran-dum, paragraph 6 (3).

Responsibilities of Revernment in connection with the maintenance of district or sillage works as fired at former settlements.

Constituent in regard to their maintenance were discussed by Committees which were appointed in 1892. The orders of Greetmuont upon their recommendations issued in Government

Revolution No. 34 W. I.—419 of 5th March 1895, Public Work- Department. It was decided to revise the list of tanks from which irrigation revenue was derived, to ahandon such as would require an excessive expenditure to place in efficient order (and where necessary to reduce the assessment accordingly), and to entrust the repairs of the remainder to the Public Works Department.

Irrigation Commission Memoran-dam, pringraph B145. Avenue sinnal expendince, it avy, incurred by Gove mean londis-tice or village works, excluding ex-penditure on rolled works during late

17. The subjoined statement shows the number of tunks repaired in the Northern and Southern I)ivisions under these orders since 1895 :-

Martin and a second second sec					of the				With Fine 1000 .—				
•	76	03-10.	16	95-97.	18	77-09.	192	5·20.	160	9-1000,	100	0-1902.	
District.	Number of tanks.	Cosl.	Number of tanks.	Cast.	Number of tants,	Cost.	Number of lanks.	Cost.	Number of tanks.	Cost.	Number of tauks.	Cart.	
•		Rs.		Rs.		Rs.		Rs.		Rs.		Rs.	
Ahmedabad Panch Blahals Broach Surat Belgaum Bijapur 1)harwar Kanara	2  26 1 4 43 	2,830 678 20,183 1,102 319 43,810	10 3 22 1 2 31	0,221 2,300 10,820 12,331 114 52,051	9 12 11 38 ;	928 197 478 2,350 7,412 41 21,004	10 10 10 10 10 10 10 10 10 10 10 10 10 1	3,256 2,668 2,506 7,426 11,349 16 83,029	3 3 3 8 6	6,70,113 330 5,574 9,020 1,227 44,008 688	27 1 6 7 1 38	13,64,583 54,849 199 8,137 11,258 258 58,169 2,509	

Norr.—In 1899-1900, 38 tanks in Ahmedahad were repaired by famine labour at a cost of Rs. 0,02,705, and in 1890-1901, 26 tanks were newly repaired and requirs to others were continued by famine labour at a cost of Rs. 13,84,674. In the Punch Maháls, items of Rs. 330 and Rs. 51,849 were spent in the famine.

In Kaira some tanks have been repaired by famine labour, but information for these has not been received from the Collector. Similar information for the Southern Division is not reported.

Mr. H. S.

Mc. H. S. In the Central Division no repairs were effected under Lawrence. these orders except during the famino, when Rs. 10,328 were expended on two tanks in the Sholspur district.

18. When "the works fail," that is, if the tanks fall

Its when the works lair, into complete disrepair, into complete disrepair, they are abandoned under the above orders. Promiselons of land revenes gives when the works fall?

in Broech, and 402 in Abmedabad have been eshmitted to Govornment, and to abandon 8 in the Panch Mahala dis-trict have been satetioned. Two tanks have also been abandoned in Dharwar. The question of remitting tenk assessment thereon will be considered by the local Revenue authorities when these proposals have been decided.

When in any particular year the tonks fail to supply irrigation, us special provision exists outside the ordinary rules for remission of land revenue for the outomatia remission of water assessment.

Irnsation Commission Memorandam, puragraph 6 (6).
Rava new works of this class been constructed?

19. No information.

It is anderstood that they are not undertaken by Dis.

frigation Commission Remorandem, paragraph 6 (7)
Are such works undertaken by District Boards; it is possible
that in Karnátak private
laudbolders undertako
trict Boards or by purvate laudowners?

Such expenditure would require to be on a commercial Irrigation Commission Memorandam, paragraph 6 (8).

Is it desirable that District funds
should be expended on each works?

not desirable that District Boards should be invested with

the pawer of levying irrigational rates, or should spend their scauty revenues speaulatively.

No such loans have been given to District Boards. To Irrigation Commission Memorandam, raregraph 6 (9).

Has it been the practice for Government to encourage the construction of soch works by leans to District Res. 1,77,226 have been advanced in teu years for this purpose.

Irrigation Commission Memoran-dum, paragraph (10).

Cau the protective value of these works be increased, etc.?

The answer would appear to be—Yes.

Irrigation Commission Memoran. existing law. In puradum, paragraph (11). graph 7 of Government Resolution No. 34-W. I.— Government accepted the view that it was decirable ta render it compulsory on the villegere to farmish such aid on may be required from them in case of emergency, or as may be needed, for the execution of minor annual repairs for the officient presorvation of a tenk, and that the law should be ultered to this end. Pending such amendment, village officers and Circle Inspectors are ordered to scaure

20. Local responsibilities cannot be enforced under the

the execution of repairs as far as possible by the villagers.

Table VIII gives the sources of water-supply for villages.

Irrigation Commission Memorendum, parsgraph (12).

Veice olsech works as coocerning reliable water-supplies for men and set of at a dictance from the cattic without reference to irrigation. village eite ure nat of great

importance for this purpose.

Irrigation Commission Memorandum, paragraph 7 (1).

Totel area irrigated by wells in ordinary years and to years of drought.

Estimato at areas irricable and seteally irrigated by wells and from small values tanks in ordinary years.

Government Memorandum No. Perasso

21. Fide Tablee I and

22. Information of annual construction is not available; Intestion Commission Memorandam, paragraph? (2).

Number of new wells.

Wells used for irrigation wells viewed by.

Enquiry is being made as to the number new next steam, and the information will be furnished to the Commission at the end of the month. Commission at the end of the month.

Irrigation Commission Memoran-dum, paragraph 7 (3).

Extent io which construction has been assisted by advances from Government.

During the ten years ending 1899-1900 advances for canstruction ond repair amounted to Rs. 57,61,746. The repair of an old well may roughly be estimated to cost Rs. 50, and the construction of a new well Rs. 200. If we assume that oos-fourth was spent on the repair of old ond the remainder on the construction of new wells, the number of wells newly constructed will amount to 21,610 and those repaired to 28,808, or, raughly, 60,000 in all.

23. Freedom from enhoncement of assessment. Irrigation Commission Memoran. porhaps doubtful whether onlivators have complete constructors of new wells. concession, though the fact that they have taken leans of Rs. 57 likhs for the purpose

would appear to show that they were free from any serious apprehensiaus. The distribution in villages of vernacular notices on the subject, a measure which is understood to have been adopted with success in the Central Provinces, would perhaps stimulate construction.

These points are not perhaps within the reference to this Department, but it may be Irrigation Commission Memarandom, paragraph (6).

Is it possible or desirable to attained the condition of advances repear to be saffimalate the construction of new weite by more liberal advances or inducesplitty of diminishing advances of the condition o

by more liberal advances or inducesibility of diminishing
monta?

delays in the grant of
loans may however, be considered; as olso the expediency of conducting experimental horings on behalf of cultivators by the agauty of the Public Works Department.

Irrication Commission Memoren-dem, peragraph 7.(6).

Extent to which woils have been infected by the droughts at 1899-1900 may be quoted. notice that the droughts at 1899-1900 may be quoted.

In parts of the Deccan and the Karnatak and In parts of the Deccan and the Karpatak and in Irrigation Commission Memorandam, paragraph (7).

Were any of those which ran dry low that irrigation was independed, and it so with what retermittent, but the deeper aging?

wells of Northern Gojorat

did not fail, and namorous kuckcha wells were suck at small cast. The oullivators were largely helped by takfur advances in constructing new and deepening old wells. The extended use of wells is visible in all the Gajarát districte, as well as in the North Deccan and Sátára and Bijápur and Dharwar.

Irrication Commission Memoran-em, paragraph 481.
Number is also or abandoned?

No information on re-

25. Average depth in Deccan 25-

-30 feet; in Gujarat Irrigation Commission Meraorando By Irrigation Commission Meraorando By Irrigation Commission Meraorando By Irrigation Commission Meraorando By Irrigation Commission Meraorando By Irrigation Commission Meraorando By Irrigation, and erea served by each.

Average cost may very roughly be put at Re. 200, but depends entirely on the character of the well and the depth of water. The report from Mr. Campbell, Executive Engineer on special duty, No. 7, dated 9th February 1885, and other accompaniments to Government Resolution. No. 448-C. W.—1059 of 28rd June 1885 may be con-

Area served by each. Vide Table V.

Irrigation Commission Memoran-dom, paragraph 8 (1).

1/2 irrigation or traces in which lands or crops are injuried by weley-logging or excess of water in very wet years. 26. Comploints

Irrigation Commission Memorandum, paragraph 6 (2) and (3).

Are additional desinage works required either on sanitary or agricultural grounds? Source from which fands should be provided for each works.

information on

Irrigation Commission Memorandem, paracraph 8 (4).
Would they result in any lacrease
of reteans or fir preventing loss of
reteans now remitted efter ceasone
of Good? now sustained through remissions, would be saved.

Irrigation Commission Memoran-um, paragraph 0. Works executed dum, paragraph 0. by relief laboor.

Itrigation Commission Memoran-dom, paragraph 16. Programmo of relief works.

Irrigation Commission Memorandum, paragraph 11. Irrigation works in Kalbiawar.

Irrigation Commission Memoran-dum, paragraph 12. Statistics for typical works.

Irrigation Commission Memoran-dum, paraemph 13. Irrigation ecceipts and charges,

Irrigation Commission Memoran-dom, paragraph 14. Value of works in reducing claims for famino relief.

27. No information on the record of this Department.

23. Tables VI and VII give the information in detail. Takári Advances.
Government Memorandam No.
P.-1033.

Previous to 1891 takevi

the etress of disastrous seasons, the system has expanded enormously. In the different tracts there are considerable

differences in the purposes for which the leans are Mr. H. 'S. Lawrence. demanded.

Of the total amount of 1043 lakes of rupees advanced, 62 per cent. was devoted to irrigation, and 37 per cent. to other land improvements, and I per cent. unspecified.

In Gujarát before 1899-1900 the same advanced did not exceed Rs. 43,000 in any year, owing, it is believed, to the excellent credit possessed by the Patidar class and the easy terms on which they received accommodation from the money-lender. In 1899-1900, however, Rs. 6 lákhs were taken in Gujarat entirely for the construction of

In the Decean in the famine of 1826-97 Rs. 17½ lakhs were given for this purpose, and in the ten years the total amounts to Rs. 39½ lakhs.

In the Kurnatak the expenditure on wells and other works of irrigation was inconsiderable in comparison with the expenditure on the construction of embankments and other methods of Field improvements, such as the uprocting of Weeds.

29. The subjoined subsidiary statements summarise these variations :-

A.

· • • • • • • • • • • • • • • • • • • •				,	IBRIOATIONA:	L PUEFGSES.		Other		Total	Percent-	
رر	iyislon.			Wetle.	Tanks.	Others.	Total.	0 5,20,990 75,900 46,80,350				
	,,	-		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.		
Gujórat	•			6,89,460	5,550	10,690	7,05,700	1,71,390	17,060	8,94,150	8.6	
Decenn	•	•	•	39,47,050	67,490	68,930	40,83,460	5,20,990	75,900	46,80,350	418	
Karnstak				11,13,310	1,01,810	4.59,170	16,74,290	29,14,500		44,88,790	430	
Konkan	•			11,930	2,380	11,590	25,900	3,16,570	27,910	3,70,380	3.6	
•	Tot	al		57,61,750	1,77,230	5,50,380	64,89,850	38,23,450	1,20,870	1,01,33,670	100	

B.

Division.						IRRIGATIONA	L FURFOSES.			
Division.			Wells. Tanks. Others. Total.		Other purposes.	Vospecified.				
Gnjárat .	٠.	•	•		77:1	0.6	1.3	78·0	19:2	1.9
Deccan .	•		•	•	81.3	1.2	1.2	87.3	11:1	1.6
Karnátak .	•	•	•	-	248	23	10.2	37.3	62.7	00
Konkan .	•	•	•		<b>3</b> ·2	0.6	3·1	6.0	85.2	7.9
		T	etal	į.	55-3	1.7	5-3	62:3	36.7	1.0

30. The statistics of the yield of crops prepared in 1897 are entered in Table IX. Government Memorandum No. P.-1053., Crop Statistics. The method in which they were prepared is explained in the fellowing extracts from the Memerandum by Mr. Muir-Mackenzie, then Survey Commissioner, which accompanied the report :-

"The general result has been that in the Deccan the estimated yields are considerably below the formula figures of 1882. The yields new returned were in the first instance worked out by the Deputy Director of Agriculture, Mr. Mollison, on the basis of the formulæ, crop experiments and personal observation. They were then observed by myself and further revised in discussion with Mr. Mollison. Lastly, Mr. Hearn, the Superintendent, Konkan Survey, was consulted regarding our final estimates. Mr. Hearn has probably taken more experiments and knews more of the yields of the ordinary crops in the Konkau and parts

of the Decem than anyone in the Presidency. He fully discussed the yields with Mr. Mollison and agreed with those at which he and I had arrived. Mr. Hearn, who was one of the framers of the original formule, admitted that the low yields of the poor soils and precarious climates were not enough allowed for in some districts when the formulæ were prepared.

The yield of irrigated crops has been mere closely ascertained and stated. Experiments and results on the Poena Farm have brought accurate knewledge of the yield of sugarcane. There can be no doubt that the tendency hitherte has been to greatly under-estimate the production of cereals under well irrigation."

The crop experiments which have been conducted since . 1897 have, awing to the abuermal seasons and the absorption of efficers on famine duties, not been sufficiently numerous to justify any alteration of these figures.

Mr. H. S. Laurence.

TABLE I.

Areas irrigated by Wells, Tanks, Other Sources and Canals.

Year,	Wells.	Tanks.	Other Sources.	Total.	Govern- ment Canals.	GRAND Total.	Wells.	Tanks.	Other Sources,	Total.	Govern- ment Cauals.	CRUND TOTAL
		A]	IMEDAB	AD.					KATE	۵.		
1893-94 1894-95 1895-96 1896-97 1897-98 1898-99	48,548 41,363 41,649 39,680 43,497 43,650 49,302 92,445	16,183 6,821 5,642 6,866 10,873 7,281 9,719	8,412 2,052 2,224 2,930 12,076 4,641	64,731 54,639 49,287 48,770 67,800 63,007 63,662 96,640	4,020 8,855 4,241 5,550 5,456 6,142 6,027 62	68,751 58,444 53,478 54,320 62,756 69,149 60,639 96,602	24,200 7,419 6,888 33,792 41,095 34,421 34,126 66,378	8,067 22,256 20,649 2,971 719 505 65	3,248 1,745 2,244 5,083	32,267 29,675 27,582 34,792 50,314 36,885 36,875 71,526	2,098 190 439 535 842 1,126 2,709	34,366 29,865 27,971 34,327 51,156 38,011 39,584 71,526
		PANO	нам н	áls.				BRO	ACH.			
1893-94 . 1894-95 .	2,221 2,228 2,200 843 2,100 2,007 2,526 7,066	164 137 200 1,013 210 170 143 4	38 25  163 32 29 14 817	2,423 2,890 2,400 2,019 2,312 2,296 2,093 7,387	30 42 175	2,423 2,390 2,400 2,079 2,381 2,471 2,653 7,387	746 681 645 610 762 762 882 5,068	287 48 117 244	    14 2	746 681 645 797 810 879 1,140 5,063	,	746 681 645 797 810 879 1,140 5,069
	<u> </u>		SURAT.			,			KHÁN	DESII,		···········
1892-93 1893-94 1895-96 1896-97 1897-98 1693-99 1899-1900	2 E110	3,294 3,271 2,787 2,991 2,835 3,238 3,521 536	55 49  258 96 475 127	10,979 11,109 10,627 10,589 10,298 10,353 10,751 12,924	   3	10,979 11,109 10,027 10,589 10,298 10,256 10,751 12,924	26,760 31,821 30,879 32,978 47,106 52,070 40,729 51,764	13  4 7 6 207 46 . 4	678 729 1,041 586 1,039 1,605 1,275 4,981	27,416 33,650 31,921 32,969 49,350 51,082 42,019 56,749	12,702 13,633 12,510 11,963 17,011 13,610 11,162 13,727	40,143 45,233 41,434 41,932 66,361 67,692 56,211 70,476
		Х	ásik.						AHMEDI	NAGAR.	,	
1000 1000	41,340 30,017 59,056	3 63 137 154 127 23	19,224 10,492 19,763 28,817 19,867 19,611 21,673 7,694	56,627 52,927 61,096 55,887 79,050 63,997 76,098 62,280	25,852 31,465 28,554 21,679 29,335 23,312 18,623 11,606	81,979 84,392 89,650 80,466 103,385 92,309 93,721 74,086	69,548 90,968 68,075 65,762 126,581 96,609 100,039 101,290		13,496 4,373 12,718 16,967 10,619 6,921 4,834 880	83,044 95,311 81,393 82,719 137,230 103,730 105,823 102,170	2,084 8,621 3,164 2,783 6,876 6,516 5,731 4,512	85,128 98,965 81,547 85,502 141,106 110,246 111,654 106,682
		PO	ONA.						SHOPY	PUR.		~
1893-91 .	58,061 61,977 63,767 66,671 81,612 75,694 66,039 61,901	1,858	14,983 11,934 9,110 7,172 11,117 10,808 13,216 2,990	73,014 73,911 72,877 73,146 94,120 88,156 81,113 65,003	29,486 34,217 35,662 31,774 46,653 61,492 41,925 31,260	102,630 108,128 108,559 101,920 140,712 112,918 122,338 87,168	73,576 83,456 87,456 87,292 82,387 90,393 91,321 94,859 91,918	15	6,468 2,985 2,730 2,809 2,311 2,211 2,384 2,061	80,044 86,141 90,012 83,196 101,709 96,332 97,242 94,042	6,771 9,158 8,115 6,791 13,138 9,145 9,835 19,392	86,815 95,599 98,127 91,987 114,847 105,677 107,077 113,484
		SATAR!	i.	•			BEL	GAUM.				
1892-93 1893-94 1891-95 1895-96 1896-97 1897-98 1898-99 1899-1900	63,085 51,906 64,014 52,272 68,021 59,138 60,554 66,901		51,485 46,500 51,189 72,161 56,205	98,806 106,391 109,511 106,152 141,082 115,313 112,279 89,675	6.201 12,765 7.864 7.359 10,917 9,393 8,530 10,662	113,811 152,029	21,373 26,667 21,419 21,785 27,757 29,470 20,695 29,326	12,607 13,559 13,216 13,010 8,560 8,093 9,079 4,239	3,197 4,625 3,599 7,841 6,027 6,899	43,423 42,290 41,393 41,201 45,570 45,678	3,525 3,578 3,340 3,397 3,750 4,597 6,174	43,867 47,001 45,739 41,790 47,751 51,069 50,180 44,955

# MINUTES OF EVIDENCE.

# Areas irrigated by Wells, Tanks, Other Sources and Canals -continued.

Mr. H. S.

Yuna	, Wella,	Tanks.	Other Sources.	Total.	Govern- ment Canals.	Gelnd Tolal,	Wells,	Tanks,	Other : Bources.	Total,	Govern- ment Canals.	Grand Total
<u>,                                      </u>		.BIJA	PUR.		-			,	IAHD	RWAR.		
1892-93 • 1893-94 • 1894-95 • 1805-96 • 1896-97 • 1897-98 • 1898-90 • 1899-1900	11,203 9,802 6,838 5,493 21,924 14,199 12,638 16,239	1,728  1,077 500 437 451	862 1,748 2,734 3,052 1,103 1,265 1,539 1,874	18,788 11,645 9,572 8,545 24,101 15,070 14,612 17,564	57 572 1,016 853 152 2 6 14	13,845 12,117 10,588 9,398 21,256 15,072 14,618 17,578	3,644 8,950 8,036 3,530 8,462 2,992 2,773 8,340	75,320 68,691 61,097 74,061 81,843 83,131 82,839 19,791	3,170 8,164 9,197 3,435 1,851 3,519 4,252 2,497	82,134 80,805 73,830 81,020 87,166 89,942 80,864 25,628	6,155 4,521 4,956 5,628 5,008 4,381 4,893 2,820	89,289 85,326 78,286 86,654 92,164 94,323 94,757 27,948
,		- TH	lna.						KOL	ABA.		,
1892-93 1893-94 1894-95 1895-96 1890-97 1897-98 1899-99 1899-1900	4,790 7,231 5,905 5,094 5,144 5,498 2,874 2,429	65 65	2,629 2,550	4,790 7,221 5,905 5,081 5,144 5,493 5,768 5,049	*** *** *** *** ***	4,700 7,221 5,905 5,084 5,141 6,498 5,768 6,019	2,322 2,135 1,923 2,001 1,918 2,061 1,731 1,302	77 71 20 17 15 25 27	77 71 223 241 281 832 509 283	2,476 2,277 2,165 2,250 2,215 2,418 2,270 1,586	10. 100 100 100 100 100 100 100	2,476 2,277 2,165 2,250 2,215 2,418 2,270 1,686
		RA	TNAGIR	I.					KA	NARA.		
1892-93 1893-94 1894-95 1895-96 1895-96 1899-98 1898-99 1899-1900	2,217 959 1,645 3,037 2,809 2,732 2,020	1,221 1,296 520 575 401  982 708	2.416 3,050 4,058 3,512 3,594 5,724 5,831 5,101	5.884 6,205 6,123 7,724 7,632 8,723 9,035 8,789	   	5,894 6,205 6,123 7,733 7,692 8,729 9,035 8,769	1,488 3,077 2,909 2,815 2,275 2,038 1,810 1,611	5,951 4,615 4,368 4,222 3,038 2,043 3,466 3,395	16,650 17,160 16,292 15,533 16,353 16,309 16,805 14,722	24,092 24,862 24,664 22,570 20,666 21,080 21,641 19,728	000 000 000 000 000 000 000	24,092 21,852 23,564 32,570 20,666 21,080 21,641 19,728

TABLE II.

Area irrigated by Canals, Wells, Tanks, and Other Sources during 1892-93 to 1899-1900.

1	•	1602-03,	1803-01.	1901-05.	1895-00.	1600-97.	1607-08.	1895-99,	1509-1000.
	Government Canals	6,118	4,015	4,680	6,015	6,340	7,416	8,736	62
Guiarís ,	Wells Tanks Other Sources	83,345 27,703 93	62,470 32,488 3,486	59,111 29,278 2,052	82,423 11,187 2,387	97,059 10,937 6,468	87,819 11,525 13,946	93,591 14,132 7,388	183,216 603 9,536
	Total	111,146	98,441	90,441	93,097	121,064	119,320	115,111	193,445
,	Total, irrigated area	117,261	103,489	95,121	102,022	127,404	120,766	128,847	193,507
	Government Canals	82,506	103,912	<b>93,</b> 839	82,219	123,890	116,470	98,408	91,259
Опесан .	Wells Tunks Other Sources	\$28,433 13 90,565	265,563 81,008	355,957 7 90,853	328,488 60 110,831	482,959 1,658 118,083	427,261 2,315 97,561	413,416 2,031 98,150	418,406 1,041 41,877
	Total	419,011	417,581	416,810	139,369	602,530	527,140	613,597	190,824
	Total, irrigated area	501,607	651,173	542,075	521,618	725,440	643,610	612,008	532 <b>,083</b>

Mr. H. S. Lawrence.

Area irrigated by Canals, Wells, Tanks and Other Sources during 1892-93 to 1899-1900-continued.

		1592-93.	1893-91	1891-05.	1895-93.	1696-07.	1897-93.	1698-99,	1899-1900.
•	Government Canals	9,737	8,671	9,412	9,878	8,710	9,862	9,406	8,509
Karnátak .	Wells Tanks Other Sources	- 89,220 89,650 7,394	40,429 82,250 18,094	34,323 74,313 16,556	33,808 87,071 10,085	53,143 91,490 10,638	46.661 92,030 12,811	45,104 92,355 12,690	47,904 24,480 9,588
	Total	136,264	135,773	125,192	130,864	155,461	151,502	150,149	81,972
	Total, irrigated area	146,001	144,444	134,604	140,842	164,171	161,361	159,555	90,481
	Government Canals	•		•••	9	Øb.		<b>;••</b>	•••
Konkan .	Wells Tanks Other Sources	10,847 7,252 19,143	13,992 5.982 21,181	12,281 4,903 20,573	18,537 4,814 19,286	12,724 3,454 19,529	12,591 2,668 22,455	9.140 4,549 25,034	8,262 4,229 22,661
•	Total	. 37,242	40,555	37,757	37,637	35,707	37,714	38,714	85,152
	Total, irrigated area	37,212	40,555	37,757	37,646	85,707	37,714	38,714	35,152
	Government Canals	98,451	116,628	109,951	98,151	138,940	183,778	116,518	99,829
Total, Presi-	Wells	461,845 124,623 117,195	481,854 120,720 119,759	461,672 108,501 130,033	159,256 103,132 142,579	646,485 113,429 154,868	574,965 108,538 146,773	561,251 113,058 143,262	657,789 30,443 83,162
Per.	Total	703,668	722,383	700,206	703,967	914,782	829,676	817,571	771,394
	Total, irrigated area	802,114	898,961	810,157	802,118	1,053,722	963,454	981,119	871,223

TABLE III,

Gross and culturable area together with proportions of culturable area protected by

Government irrigation works, private or village works, and wells.

•				l			Pı	PROTECTIONS OF CT		ea.
	District.				Gross Area.	Culturable Area.	Government irrigation works.	Private or village works.	Wells.	Total.
	Guzanát									
Ahmedabad		•			2.171.762	1,704,691	02	0.7	29	3.8
Káira .					988,764	821,721	0.1	1.0	3.8	4.9
Panch Mahal	9.		-	ا ۔	1.027.086	226,111	0.0	l, ool	0.4	0.4
Broach .			:		920,594	675,882	0.0	0.0	0.2	0.3
Surat .		•	•		1,032,135	802,112	0.0	6.0	1.0	1.3
		Tota	al		6,090,941	4,730,460	0·1	ō.2	2.0	2.8
	DECCAN.							-7		
Khandesh				. 1	4.773.452	3,535,114	0.4	0.0	1.1	1.5
Násik .		·			3,631,575	2,501,515	1.0	0.7	1.8	8'5
Ahmednagar	: :	:	•		4,120,212	3,164,381	02	0.2	2.8	3.3
Poona .	•	•	:		3,361 685	2,502,754	1.2	0.4	2.6	4.5
Sholapn	: :	:	:		2,906 383	2,479,224	0.3	0.1	3.5	4.1
Sátára .		:	:	•	2,874,832	2,153,164	0.4	2.2	2.8	5.4
		To	tal		21,673,639	16,336,152	0.6	0.2	2.4	3.2
	Kabratá	ĸ.		]						
Belganm		•			2,812,527	2,195,086	0.2	0.7	1.2	2·1
Bijepnr .	•				3,616,756	3,227,077	0.0	0.1	0.4	0.5
Dhárwár	• •	•	•	•	2,868,057	2,412,321	03	3.0	0.1	3.3
		To	tal		9,293,240	7,834,484	0.1	1.2	0.2	1.8
	Koneal	τ,								
Thána .		•		•	2,214,911	1,050,600	0.0	0.1	0.2	06
Kolába •				•	1,316,517	751,701	0-0	0.0	0.3	0.3
Ratnágiri				. !	414,402	287,927	0.0	1.1	0:0	. 20
Kánara .		•	•	•	2,521,897	388,244	0.0	5.2	0.6	58
		To	tal	•	6,500,727	2,478,472	0.0	1.0	.05	· 1·5
	GRAI	d To	Tal	•	48,563,547	31,379,568	0.4	0.7	1.7	2.8

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Table IV.

Rainfall at Head-quarter Station.

Mr. H. S. . Lawrence.

District.	1891.	1892.	1893.	1874.	1895.	1896.	1897.	1899.	1899.	1900.	Average for 10 years.
GUJABAT.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
1. Ahmedabad	25.59	51.18	43-75	51.61	31.85	32.40	31.18	36.53	4.72	16.78	32.56
Z. Kiara	28.27	5845	41.17	49.55	33.71	40.28	24.07	34.63	6.02	21.98	33.83
3. Pauch Maháls (Godbra).	29.08	. 44:72	49.02	59.92	35.43	47.87	30.0T	42:49	8.67	32.73	38.74
4. Broach	58 64	39-12	52.24	65.49	28.84	69.99	42.34	47.51	9.61	32.80	44.66
5. Snrat	63.89	55.15	45 45	65.03	29 07	4283	30.03	32-52	18.49	34.19	42.57
Deccán.	,			•			1				'
6. Khándesh (Dhulia) .	24.58	27:87	24.77	23.08	29:05	20.52	30.81	21.03	8.64	13.88	23:02
7. Násik	25.99	35.14	39.38	30.04	29:51	36.24	28.46	27.59	14.57	32-98	80.00
8. Ahmednagar .	16.18	42.16	25.65	25:35	25.97	19.66 43.41	18:23	14·78 22·92	12·32 12·37	17·85 30·56	21.80
9. Poons	18.69	45 19	82:12 83:85	83·59 20·97	32.43	18.40	37·18 20·42	34.85	12.81	18 93	30.85 .25 44
10. Sholapur	2476	39:28 43:47	43:96	50.28	37.12	60.83	46.61	85 97	20.34	43.47	40.89
	1000	30.37	20.00	0000		!			1	1	1
KABNATÁK.	43.34	64.01	49.67	48-19	47:00	63.70	45.28	52.79	28.63	63.50	50.62
12. Belgaum 13. Bijapur	13.70	35.37	28:45	20-11		1103	38.47	26.08	19.07	13.74	23.19
14. Dhawar	27.84	37.26	82.34	25 81	29.88	39.04	41.21	41.95	23.26	31.21	33.0
									1		i
Konkan.	99.35	131.62	93.95	107.86	03-63	133.70	121-17	108-80	41.87	89.61	102.0
16. Kolába (Alibág)	82.03	117.42	80-33	93.30	81.17	113.75	101.03	101 48	44.45	8001	89.5
17. Ratnágiri .	91.17	137-60	87-99	96.83	85.40	67.78	136-16	118.97	59 21	95.92	97:7
18. Kanara (Karwar)	82.28	154.56	111-08	90 08	102:99	99.32	129.75	133.75	72.33	131.17	110 8

Table V.

Wells and tanks and estimates of areas irrigable and actually irrigated from wells and tanks.

		WHLLE,			TANKE,			Wzi	LS.			TANKS.	
Pistrict,	1956-97.	1801-93.	1896-07.	1690-87.	1931-92	1995-97.	Number in 1490-67,	Area irrigable (at an entimate of 4 neres per well).	Area irrigated.	Ares irrigater per well,	Vamber In 1896-97.	Ares Irrigated.	Ares irrigated per tank
1 ,	2	3	4	5	ß	7	8	p	10	11	)2	13	16
Gujrát.	No.	No.	No.	No.	No.	No.	No.	Acres.	Acres.	Aures.	No.	Acres.	Acres.
Ahmedabad .	13.548	14,526	13,209	887	1,123	1.092	13,209	52,836	49,497	9.3	1,033	10,878	10:05
77 1	8.057	8,708	8,481	724	913	891	8991	35,936	44,005	40	891	2,971	3.3
72 3 35 1 41	1,212	1,865	1.515	2	2	2	1,515	6,180	3,100	1.3	2	2,871	105.0
Breach	654	703	723	78	81	105	723	2,802	762		_		
Surat	6,186	5,878	6,033	1,021	961	901	6,038	24,152	7,205	1.05	105 981	2,835	2.9
Total .	20,687	91,176	30,499	2,715	8,080	3,044	80,499	121,996	97,659	3.2	3.014	16,937	5.5
Decear,	<b> </b>		1						-	<u> </u>			
	15,854	17.007	22,016	١			22,015	00.000	17.400				l
Khundesh			18,000	11	25	15		88,000	47,406	2.1	15	6	0.4
nesk	TOWN	14,218		75	10	9	18,000	72,036	59,056	3.2	9	137	15.2
Ahmednagar .	22,035	22,278	27,649	139	135	0	27,619	110,598	126,591	4.6	6	i	•••
Poona	16,177	17,780	20,176	80	52	21	20,170	€0,701	-81,612	4.01	21	1,400	65.6
Sholápur • •	15,022	16,432	10,095	5	4	'11	10,095	76,380	99,383	5.3	11	15	1.3
Satara • ' •	19,222	19,206	22,326	18	20	24	23,320	89,304	68,021	3.1	24.		,,,
Total .	101,341	107,011	129,270	*828	246	86	129,270	517,080	482,959	3.7,	86	1,568	,18·1
Kannatan.		· .	,										
Belganm	7,690	8,560	10,059	229	445	859	10,059	40.236	27,767	2.7	859	8,560	g·9
Bijapur .	3,787	4,901	7,185	4	10	10	7,185	28,740	21,924	3.05	10	1.077	107.7
Dhàrwar	4,004	4,418	4,511	2,310	2,687	2,404	4,511	18,014	3,462		2,401	81,843	34.0
Total .	15,481	17,874	21,755	2,543	3,142	3,273	21,755	87,020	58,143	2.4	3.278	91,450	27:9
Konenan					:			·	·				
Daine	3,887	4,045	4,098	- 15	10	13.	4,006	16.384	5,144	1.2	:13	,	
Kolába .	1.446	1,303	1,834	. 1	10	3	1,334	5,336	1,918			***,	**.
Katnagiri	8,054	4.485	6,758	86	74		5,758	23,032	9,387	1.4	3	15	5.0
Kanara .	11,558	12,188	14,345	3,110	4,821	4,631	14,845	57,380	2,275	0.19 0.19	05 4.631	401 3,038	643 046
Total .	19,946	22,021	25,533	3,162	4,406	4,713	.25,533	102,132	13,724		4712	3,454	0.73
GRAND TOTAL .	166,454,	178,081	207,057	8,748	10,874,	11,115,	207,057	828,228	616,495	3.1	11,115	113 429	10.2

Mr. H. S. Laurence.

TABLE VI.

Takavi advances given for the construction and repairs of Wells, Tanks and Other Sources of irrigation and for other improvements.

						older im	processo	166.	For	1251017	ION PURPOS	<b>50.</b> [	
Ysar,	un 1	Total dvances der Laud mprove- neut Act.	Wells.	Tanka.	Others.		Far other Improve- ments of land.	Total advances inder Land Improve- ment Act.	Wells.	Tanks,	Others.	Total,	For other improve- ments of land.
<del></del>			AHNEI	DABAD	•			•		KAI	R <b>∆.</b>		
1890-91 . 1891-92 . 1892-93 . 1892-93 . 1893-94 . 1894-95 . 1895-96 . 1496-47 . 1897-98 . 1898-99 .		7,775 3,900 2,600 275 4,725 12,735 3,705 2,110 1,735 144,201	7,775 3,400 850 275 4 575 9,203 8,005 2,110 1,635 141,301	*** *** *** *** *** *** ***	700	7,775 8,400 850 275 4,575 9 205 3,703 2,110 1,785 141,301	500 1,750 1,750 3,680  2,900	4,725 2,030 940 3,005 1,520 7,560 2,150 100 214,749	3,650 2,090 300 2,930 400 7,560 2,450 100 205,839	225	160	3,875 2,090 460 2,930 400 7,560 2,450 100 214,749	850 480 76 1,120 
		P	ANCII 1	AIIAM	LS.					BRO	VCIT.		
1690-91 1891-92 1692-93 1693-94 1891-95 1895-96 1696-97 1696-97 1898-99		200  900 350 550 	200 300 350 550 Details	not av	a ilnble,	200 300 550 550	••• ••• ••• ••• ••• •••	550 2,285 555 	500 2,235  151,277	50	620	2,225 520  151,277	25
			នប	RAT.	<u></u>		·		<u>'</u>	KIIA	NDESH.		
1890-91 . 1891-92 . 1892-93 . 1893-94 . 1893-96 . 1896-97 . 1897-98 . 1898-99 .		18,840 14,900 16,465 5,825 25,585 15,165 990 11,759 191,247	\$,000 1,400 5,250 4,350 3,875 4,250 5,000 7,175 105,000	500 1,47 300	\$00 \$	3,500 1,700 5,750 5,825 3,876 4,650 3,00 7,175	15,810 13,200 10,715 21,710 10,615 60 4,581 83,747	2,000 1,700 4,500 11,800 23,000 142,195 7,715 16,150 256,705	Detail 1,700 3,850 19,800 159,605 7,743 16,176 255,716		7 ailable. 200 8,450	19,500	700 3,200 2,705
<del></del>			Nasii	ζ.					V	ŅŒD:	SAGAR.		بد
1890-91 1691-92 1892-93 1893-94 1894-95 1895-96 1896-97 1897-98 1898-99 1899-1900		8,265 17,673 21,650 18,730 29,900 30,452 189,755 6,100 4,365 198,383	500 9,500 19,700 14,425 27,525 132,748 6,160 4,328 197,288	Deta	4,005 ils not avai	3,500 19,700 18,430 18,430 13,546 27,725 136,765 6 160 4,323 197,268	40	20,250 13,025 8,010 19,010 25,410 (56,176 100,270 21,332	18,950 12,200 7,400 16,685 21,200 638,685 91,520 21,300		1,300 2,425 17,495	12.20x 7.360 19.010 21.203	825 550 4,205 8,740
			I	kzoor	•					sno	Lapur.		
1890-91 . 1891-92 . 1892-93 . 1893-94 . 1894-95 . 1896-97 . 1896-97 . 1898-99 . 1899-1900		92.035 40,350 18,785 31,225 34,635 372,903 39,030 48,480 290,720	22 19 12,6 23,6 10 25,32 272,520 30,935	5 18.1 5 8 0 5 48,5	30 3,000 250	40.350 13.163 23.010 25.920 321.350	5,32 7,55 9,31 48,55 7,82 13,91	5 23,600 0 21,670 3 367,030 5 12,660 0 87,571	30,13 0 25 49 5 5,51 0 14,01 5 13 12 332,21 4.46 5 22 73	50 00 50 50	750	42 50	5 31,220 0 5,023 5 9,644 5 11,666 9 34,810 0 8,200 0 14,840

Takuri advances given for the construction and repairs of Wells, Tanks and Other Sources of irrigation and Mr. II. S. for other Improvements—contd.

4	Total	For	e izrigi	rion Pone	335.	For other	Total	For	IRRIGAT	non Perso	RES,	For other
Take,	nder land Improve ment Act.	Wells.	Tanks.	Others.	Total.	in prove- meria of land	advances under Laud Improve- ment Ack	Wells.	Tanks.	Others.	Total.	improve- ments of land.
**************************************	. <u></u> .	SAT	KRA.	,		1	]		BELG	AUN.	<del></del>	
1890-91 .	3,640					3,640	c9,965	11,225	800	11.440	28,465	46,500
1891-92 . 1892-93 .	43,988	14,385		ils not ave	ilable. 14.385	4,155	187,705 42,860	57,135 8,140	3,100	127,195	184,330 11,240	3,375 31,620
1893-93 1893-94	18.975	15,985	***	***	16,985	2,990	104,850	29,495	2,700	200	32,395	72,455
1894-95	22,385	14,050		4	14,050	8,315	152 550	49,450	3.550	50	53,050	99,500
895.96	. 37,570	22,655	•••	•••	22,655	14,915	164,526	43,325	1,500	3,000	47,825	118,700
1896-97	. 351,893	259,795	•••	550	240,345	111,018	103,750	70,820	63,780		124,100	279,650
1897-98	17,955	15,015	•••	200	15,615	2,340 7,660	= ====	30.00	1 700	305	10 005	90 975
1898-99 1899-1900	45,205 802,768	37,345 267,363	***	200	37,645 267,363	85,405	54,500 257.020	16,000 101,211	1,500 3,075	1,575	17 025 105,861	36,875 151,159
		BIJA	PUR.	'					DHA	RWAR.		<u> </u>
	1	1 1			1	<del></del>			1	1	1	
890-91	2,200	1,200	***	4.50	1,200	1,000	61,280	23,700		1,000	24,700	36,58
891-92 .	224,791	76,747	200	47,497	124,484	1,00 307	243,560	30,475		250,985	283,560	
892-93 .	14,47.2	8,222	1,700	•••	4,922 3,290	9,580	24,741	7,381	1,100 2,450	}	8,481	16.26
893-94 . 894-95 .	125,950	3,250 15,630	•••	•••	15,630	48,195 1,10 820	164,275 191,675	22,325 19,475	2,025		24,775 21,500	189,50 170.17
895-96	97,020	7,775		•••	7,775	89,245	167.175	36,040	2,700		39,930	127,24
896-97	918,625	851,670	***	1,220	352,890	5,65,735	266,830	83,700	4,200		38,200	228,63
897-98	19,330	4,675	***		4,675	14,655	400				101	40
1899-1900 1899-1900	32,567	6,920 41,750	***	,	6,920	25,617 1,04,365	40 292 215,955	9.975 31,028	1,30L	7,500	18,775 50,943	21,51
	1			1	1			1			1	1
- 1		TH	ANA.						KO.	LABA.		•
1890-91										•••		
1891-42 .	* ****	•••	***	***	•••	****	***					1
1892-93 1898-94`.	330 5,740	200	•••	***	200	330 5.540	1,900	***		•••	•••	1,90
894-95	3,600	300	***	***	800	3 300	9,805	300	•••		300	3,81
1895-96	5,250	300	***	•••	1	5.250	16,410	1	***	***	300	16.41
896-97	5,075					5,075	51,870	1,600			1,600	50,27
897-98		***	940				8,000	450	1	1	450	7.55
1898-99	3,150	6C0			600	2,550	8,950		1			6,95
1899-1900	54,055	1,345			1,345	52,710	25,930	500			500	25,43
4		RATN	KGIRI						KA	NARA,		
1890-91 .		T				T	4,200	Ī			T	4,20
1891-92		1		-			18,950	Detail	not a	vailable.		2,20
1892-93	•			1			23,000		500	1.300	1,800	21,20
1893-94	450	l		l		450	22,950	441		3,400	3,400	19,55
1894-95	8,960	Details	not av	nilable.	{		19,210	720	1,035	6,840	8,595	10,61
895-96 .	7,955	90:0				7,955	13,123	1,900	830	50	2,780	10,34
1896-97 . 1897-98 .	16,015	2,950	•••		2,950	13,065						•••
1897·98 1898·99	. 5,730 . 3,570	111	•••		1 ***	5,780		550	20	***	570	6.61
1899-1900	8,000	1	•••	•••	•••	3,570 8,000		610	1	···	570 510	6,61
	1 0,000	1	•••		***				***	440		

Mr. H. 8. Laurence.

fabra VII.

Takdvi advances granted for the construction and repairs of Wells, Tanks and Other Sources of irrigation and for other Land Improvements.

				2	, com ,	2000 0000 00000 0000	- 1	y trigate	n ana Jor	other Land	cources of irrigation and for other Land Improvements.		
		91.	1891-07.	1892-93.	1823-0 L	180 1-85.	1805 98.	1806-97.	1897-09.	1809-00.	1890-1900.	Total,	Avorage.
	C Total advances	7,775	75 27,665	65 20,140	17,680		42,425	27,535	4,950	13,501	*718,531	*894,160	*80,415
	Wells Tanks Other Sources of irrigation .	7775	75 10,250	25 4,840 25 50 300	5,825 6,0 100	12,155 1,475	16,086	15,365 300 1,220	4,860	8,910	603,417 2,500 8,910	689,462 5,650 10,690	68,0.(6 555 1,060
	Total	7,775	75 10,975	70 5,190	0,485	13,630	16,065	16,885	4,860	9,010	614,837	705,708	70,570
	Other improvements of land	-	!	90 14 950	11,195	225	26,360	13,650	8	4,681	20,647	171,301	17,130
	Total advances	. 17,580	- 1	11 156,716	70,535	*137,960	181,912	2,029,169	183,820	173,407	1,6(2,413	*4,680,852	4468,036
DECOAR .	Wells Tanks -{-Other Sources of irrigation	5,0	5,675 137,562 500 26,795	62 95,660 18,155 95 750	69,645 800 4,205	71,610	129,925	1,755,876 48,539 25,360	156,465	136,477	1,398,630	3,047,045	394,705 6,748 6,893
	Total	6,1	6,175 164,347	14,565	64,656	82,515	129,925	1,829,266	156,715	136,677	1,398,630	4,083,165	469,916
	C Other improvements of land	11,405		8,173 41,150	14,885	25,645	52,u]7	20 :,203	27.105	38,730	103,783	620,090	62 090
	Total advances	183,445	45 696,068	66 82,408	320,610	470,175	43,720	1,589,205	19,750	127,359	060'019	4,488,793	448,679
Karnâtae .	Volls Tanks . Tanks	86,125 800 12,440	25 164,397 00 2,900 10 425,077	197 18,743 100 5,900 77	5 65,110 5,150 200	84,555 5,575 50	87,140 4,260 4,130	465,690 67,980 1,620	4,673	32,806 2,500 7,635	173,981, 16.441	1,113,914	111,331 10,181 45,917
	Total	49,365	65 592,374	174 24.643	80,400	90,180	95,530	616,100	4,675	43,320	198,654	1,674,201	167,429
	Other improvements of land	84,080		4	24	379.996	335,190	1,074,015	15,055	84,039	420,536	2,814,602	281,450
-	Total advances	4,2	4,200 *18,850	150 25,230	32,965	*41,675	42,738	72,960	18,730	20,853	97,186	*370,376	*37,087
Конкан	Wells	:::	:::	1,300	3,400	1,320	1,960 830 60	4,550	460	1,150	2,355	11,926 2,386 11,690	1,193 238 1,169
	Total	•••	**	1,800	3,660	9,195	2,780	4,550	450	1,170	2,856	26,900	2,490
	Other improvements of land	4,200	إ	_	4	23,420	39.968	68,410	13,280	19,683	94,830	316,560	31,657
	Total advances	163,000	00 •961,182	82 283,488	450,780	*663,686	697,525	3,719,169	232 230	336,213	42,937,219	*16,433,671	*1,013,367
YOTAL, PRESI- DRNCY PROPER.	Tanks	48,575 800 12,940	75 312,198 00 3,625 10 451,872	99 119,243 25 24,605 72 2,350	120 780 6,450 7,985	169,670 8,085 17,765	235,036 6,031 4,180	2,230,981 100,810 28 100	166,460	179,483 2820 7,925	2,178,386 18,941 17,039	6,761,746 177,226 650,386	676,176 17,723 65 038
r <b>ı</b> l	Total	. 63,316	16 767,696	96 146,198	135,195	195,520	214,300	2,365,801	166,700	190,177	2,214,366	6,489,358	648,936
	Cother improvements of land	98,685	86 128,646	45 187,290	315,585	429,186	453,525	1,353,278	65,630	145,630	765,700	8,823,455	382,345
	•												

. The totals marked with actories do not agree with the scinal total of the details as they include some for which no details are supplied,

TABLE VIII.

Wells and Tanks used for drinking purposes and for cattle and washing—1896-97.

Mr. H. S. Lawrence.

,		<del></del>	Werls.		Tanks.		71	ille,	,	Cares.
District.		For drinking supply of hurono beings, bot not for irrigation.	For eatile and washing and other purposes, but not for irrigation or drinking supply of human beings.	For drinking supply of human beings solely.	For enttle and washing oud oliver purposes, but not for irrigation or driaking supply of human belogs.	District.	For drinking supply of human beings, but not for irrigation.	For cattle and washing and other purposes, but oot for irrigation or drinking sopply of human beings.	For drinking sopply of human beings solely.	For estile and washing and other purposes, but not for irrigation or drinkior supply of homan belogs.
Gujarát		•	•			Kabnátár.				
Ahmedabad Kaira Pauch Maháls Broach		2,078 2,098 1,624 1,776	618 536 120 1,190	503 24 19 03	2,150 3,720 690 1,983	Belganm Bijápur Dhárwár	5,023 2,411 4,222	784 842 3,778	158 87 1,123	693 226 2,841
Surat .	•	6,469	1,318	162	678	Total .	12,550	5,404	1,368	3,760
Total		14,010	3,782	771	0,221	Korele,				
DACCAN. Klándesh. Násik Ahmedungar Poonn		23,064 • 6,718 6,242 4,452	891 584 1,025 399	22 18 14 56	98 180 66 143	Thána Rolába Ratnúgiri Ránara	7,139 4,973 6,232 20,461	377 316 798 1,401	84 104 186 699	938 596 179 1,771
Sholápur . Sutára .	:	3,303 ; <b>5,</b> 011	582 253	50 50	187 90	Total .	83,801	2,690	973	3,484
Total		48,123	3,681	165	701	GRAND TOTAL .	113,823	15,760	8,277	17,169

Table IX.

Estimated dere Field of the principal Crops.

fal for					Iu	RIGATEL	١,						Day-cro	P.	
Serfal Number.	District.	Rice.	Wheat.	Speit.	Jonári.	Ragi.	Gram	Ground- nut.	Sugar-	Bice.	Wheat.	Spolt.	Jowári.	Ragi.	Gram.
	,	Lba.	Lba	Lis.	Lbs.	Lba.	Lbs.	Lbg.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
28	Ahmedakad . Kuita . Panoh Mahals	***	1,300 1,300 1,300	444 444 414	010 000 000	614 114			6,000 6,000 5,000	1,440 1,820 1,200	560 600 700	, ,	1,080 1,050 1,190 (maize)	1,410 1,410 1,420	500 500 600
. 4	Broach	, ·	***	***	101				7,000	900	600		Kh. 1,160 R. 1,020	} 1,500	200
5 6	Snrát Khándosh		1,280	1,500	6+4 5***		1,200	3,000 3,000	7,000 7,000	1,560 1,080	560 600	411 941	1,160 720	1,200 900	500
7	Nacif		1,320	1,500	Kh R. 1,400	1,400	1,200	8,000	7,000	3,090	460		520	850	850
8	Ahmedongar.	•••	1,260	1,000	R. 1,800	1,400	1,200	3,000	7,000	1,010	460	{	Kh R. 540	900	330
. 9	Poon	•••,	1,060	ל ממיינד	Rh R. 1,500	}	1,200	3,000	7,000	1,120	350	190	500	900	820
10	Sholapur .		1,950	1,000	Kh R. 1,500	}	1,200	3,000	7,000	900	400	{	Kh R. 540	}	860
11	Satára	•i*•	1,350	1,000 4	Ku R. 1,500	}	1,200	3,000	7,000	1,120	480		720	900	880
12	Belgaum .	•••	1,200	4,000	Rh	٠	***	3,000	7,000	1,140	560	***	800	908	400
- 11 13	Bijápur. Dhárwár	***	1,050	1,500 \ 1,500	***	•••	***	3,000 3,000	7,000 7,000	800 1,110	400 600	166 201	510 900	1,200	310 500
15	lhána		411	***	***	•••		111	7,000	1,200	***	***	{	Early 770 Late 1,540	100
10	Kolaba		•••	***		•••	•••		4,000	1,320		400	{	Early 800 Late 1,600	380
17	Ratusgiri .		٠,,,	***	400	***		•	4,000	1,020	•••		{	Early 680 Late 1,360	}320
, 18 19	Kánara Karáchi .	000	029	***	585	•••	325	***	7,000 4,850	1,020				1,170	480
20		1,140	1,093	404	1.003	***	410	1004 250	2,500	***	::: 1		***	691	100
21 22	Slitkarpur Upper Sind	1,200	1,246	***	1,167		816		***						***
23	Frontier That and		903	•••	652		802				i.,		•••	,	en!
	Parkar .	D00	\$ <b>60</b>	•••	,···	***		144	***						,01
	1 .	۱ ′			3		1			1		1			

Norr.—As rice generally gots only a few waterings at the close of the season, no figures for irrigated rice have been separately shown.

Information on some of the points mentioned in the mamorandum of questions by the Irrigation Commission, embodied in Government Resolution No. 2275, dated 26th October 1901.

τ.

2. The gross area in the district is 3,742,671 acres.
The culturable area in the district is 2,511,017 acres.

A statement comparing these acres for the last five years is attoched (1).

The soil of the open country ranges from deep black loam to light-coloured grovel; in the hilly country (? laterite) soil is found in places. The general geological formation is Deccan trap.

Nearly all kinds of kharif and rabi arops grow in the plains, especially wheat, hajri, jowari, gram and sugarcsne, etc.; rice also grows where it gets abundant canal water.

The soil of the rainy hill country produces rice, nagli varái, tur and udid. Whest, bajri and gram are also grown on this soil, but only to a small extent.

Extent to which cultivation is dependent on artificial irrigation.—Statement No. II will show the extent to which the different crops are dependent on irrigation.

#### RAINFALL.

The average ruinfall of the Néaik district at headquarters during the rainy season is about 30 inches and at taluka head-quarters it is as undar:—

					Inches.	Cents.	
Sinnar					. 26	28	
Igatpuri					. 143	83	
Dındorl		·			. 31	39	
Niphád				·	25	31	
Chandor			•	•	. 27	84	
Yeola					. 24	53	
Malegnon		•			. 23	27	
Nándgaoi	1				. 28	74	
Báglan					. 21	40	
Kelwan					. 27	69	
Peint	_				. 91	32	

The average is for elevon years (1887-1897) as found by the Survey Commissionar and published at page 88 of the Bombay Government Gazette, Part III, for 1900.

How the distribution of water is controlled.—In the case of bandharas in obarge of the Rovenno Department, i.e., the revenue of which is credited to Land Revenue, the distribution is controlled by the village and taluka authorities. They see that the irrigators take water on fixed days and at fixed bours and irrigata only anthorized parts of the fields.

In the case of handheras in the charge of the Public Works Department, i.e., the revenue of which is credited to that Department, the distribution is controlled by the officers of the Public Works Department and also by village officers concerned, to whom information about the grant of water is supplied, and they control the distribution accordingly. Petitions are received by the officers of the Public Works Department for water for a particular zero, and they dispose of them according to the cupply of water in particular year.

In what form the irrigation revenue is collected.— The phrase "Irrigation Revenuo" is applied only to the bandham revenue creditable to the Public Works Department. This revenue is realized in the form of water-eess which is fixed by the Public Works Department according to the nature of crops for which water is allowed. The collection is munaged by the Ravanno Department. Village officers collect the revenue and romit to the Taluka Trensprice on receipt of statements annually from the Public Works Department.

- In the case of Revenue handharas the assessment is collected by the village officers with other items of Land Roycune.
- 6. By whom district or village irrigation works are constructed and controlled.—District irrigation works are constructed and controlled by the Public Works Department and village works by the Civil Department.

Number of district or village irrigation works and the aggregate extent of cultivation dependent on them.—The following is the number of district and village works:—

						٠.	713.
Násik							5Ò
Sinusr		•	•	٠		•	46
Dindori	•	•	•	, .	•	•	27
Niphád	•	•	•	•	•	•	27
Chandor					•		43
Yeola	•		•			٠.	2
Kalwan		•		•			29
Báglan		•					14
Malogaon			•	•	•		12
Nandgaor	l	•	•	•	•	•	2
						•	
					Total		282

Besides these there are the Paronl, Ozar, Tambat, Pal-khad, and Wasali Canals.

In all there are 280 canals of varying size.

Responsibilities of Government in connuction with the maintanance of district or village works as fixed atformer settlement.—In the interest of the irrigation revenue Government must keep the works in constant repair, as if the scorce of irrigation falls the revenue must be remitted.

In the case of the older works the repairs of the channels and water-courses are carried out by Government agency, but 10 per cent. of the cost is recovered from the irrigators. There is no dicticet unthority for this precedure. Repairs to the main heads, tanks, etc., ere, however, carried on entirely at Government expenses. It is to be observed that not a few of the minor dams (bandharas) are at present ailted up and necless.

Have new district or villaga irrigation works been constructed of lato years otherwise than as famine relief works?—No new district or villago irrigation works such as would be useful to onlivation have been constructed of lato years. The Khirdi Sathe, Olel and Chankapur tanks have been begun but not completed.

Noither private land owners nor the District Local Boards have undertaken or can undertake such works: nor can Government afford money for loans to them for such purposes.

The works constructed in the late famines as well as those existing before them have considerable value as sources of water-supply for men and cattle without raference to irrigotion.

The following sums were expended on village tanks in the late famines of 1899-1900 and 1900-1901:--

					Rs.
1. Hiswni Tank					1,267
2. Sherul Tunk.					1,758
3. Dowolghat Tank				1	723
4. Khadke Tank					2,332
5. Dapure Tank			•		1,929
6. Sayane Tank					4,968
7. Zodge Tank .	,				3,065
8. Palasdare Tank					380
9. Chikhalwahal Tu	ık				1,838
10. Kalamdari Tank					135
II. Pokhri Tank					929
			•		193
12. Ménikpanj Tenk					132
13. Raugari Tauk		•			1,619
					21,288
				΄, '	
14. Khokad Tonk					14,798
la. Mapurwadi Tank		٠,٠		· •	6,578
16, Sonaj Tank			•		6,615
		,	٠ َ و		<u> </u>
			-	٠,	49,279
-#		•			

Of the above-mentioned only two were completed before the mensoon of 1901, viz., the Maparwadi and Sonoj tanks.

As the rainfall of 1901 was inadequate, it is not yet possible to soy how far the works will be usoful.

The protective value of the Docan irrigation works during the famine of 1897 was considerable, but in 1899, 1900 and 1901 it became less and less in each year as the rains were less heavy and the subterronean springs gradually failed.

No accurate statistics, such as can be relied on as data for a scientific inquiry, are available as to the areas irrigated in the year 1897 and subsequently, but in Statement No. 1 rough stotistics are given.

Fomine relief was necessary to some extent in the form of omployment on relief works and also in the form of gratuitous relief in most of the villages protected by irrigation works. In the case of agricultural lobourer and non-agriculturists residing in sooh villoges, as in the years of drought they could not get usual field-labour to the follest extent owing to the high prices of groin and the diminution of area cultivated, agriculturists foiled to employ the usual number of labourers and did much of the work themselves. Such labourers and their dependents had therefore to be relieved at the works or by dole. It is beyond doubt, however, that the cest of famine relief would have been more if the irrigation works land not been in operation, as in that case a greater number of agriculin operation, as in that ease a greater number of agricul-turists themselves would have resorted to relief works.

· Statement No. I showing culturable and irrigated area, Násik Division.

4,	, ,					PRECESTAGES OF AREAS PROTECTED.										
Serial No.	Year		,	Gross stes.	Cultarable area.	Bres	inste.									
						Govern- ment.	Private.	By wells.	By tanks.	By other sources.						
1	2	,		3	4	6	G	7	8	8						
1	1896-97	•	•	3,724,162	2,450,580	1:2		2·4 (59,056 acres.)	•0056	-81						
2	1897-98		•	3,724,297	2,450,234	*95	*0086	2 <sup>.</sup> 009 (49,232 acres.)	·0064	•79						
3	1838-90	٠	•	3,722,901	2,450,788	•76	•••	2·05 (50,298 aercs.)	·0052 ·0052	•006 1•008						
Š	1899-1900	•	•	3,741,947	2,501,515	•47	•0060	2·18 (54,563 acres.)	•••	-30						
6	1900-1901	. •	•	3,742,671	2,511,017	·65	•035	1.55 (39,170 acres.)		45						

#### Explanation.

Column B represents the total area of the district.

Column 4 inclodes not area cropped (after deducting the area cropped more than once), current fallows and
assessed and massessed area available for cultivation.

Column 5 represents area commanded by Government canols directly managed by the Irrigotion Department and

the revenue derived from which is exclited to that Department.

Column 7.—The figures in italies in column 7 show the area in acres noder well-irrigation, while the reman figures represent the percentages of this area with reference to the total outurable area. This information is given only with respect to well-irrigation which has been taken to mean "artificial irrigation."

Column 9 represent area—advantaged.

Column 9 represents area under pais and bandhares managed by the Revenue Department and the revenue derived from which is credited to that Department.

Statement No. II showing the names of crops irrigated and the number of waterings they require.

Names of crops irrigated.	Period during which crops are untered.	Number of waterings and the intervals at which they are given.	Remarks,
Eugarcane	Throughout the year os this is a percunial crop.		When the rains prove amply sufficient the period of watering can with safety be prolonged to a fortnight.
Ground-nut .	Wet weather crop— June to October. Hot weather crop— October to February.	8 waterings, cach ofter an interval of 15 to 20 days. When the raies prove sufficient ground-nut stands in need of little	So long as the rains continue no water is required, but whenever there is a break losting over a period of
, ,	October to replanty.	or no irrigation.	one watering every fortnight. In some parts ground-nut is required to be irrigated after an interval of
Poistors	Wet weather crop— June to August, Het weather crop— October to February	8 waterings, each after an interval of 20 days.	8 to 15 days.

Mr. A.	R.
Bonu	t.

	mes of ero lyrigated.		Period during which crops are watered.	Number of waterings and the intervals at which they are given.	Reyarks.
Rice	•	٠	July to October	No water required doring duys of notual rainfoll. In September und October the crop is required to be irrigated every fourth or aixth duy.	
Wheo Grain Udid Khon Walki	da .		October to Jimmary .	46 waterings, each after an interval of 20 to 30 days. 6 waterings, each after no interval of 15 days.	

## Answers to printed questions.

- 1. The onswers helew refer to the Nosik district.
- As I only came to this district in April 1901 and have never seen it before, I cannot say that I am well acquainted with it as yet.
- 2. A stotement chowing the average rainfall in each month of the year at the head-quarters of the district and also at the head-quarters of each of the talukas in the district is uttached.
- 3. Practically there is no obstacle to the extension of irrication arising from-
  - (1) Sporsity of population.
  - (2) Insufficient supply of cattle suited to the cultivotion of irrigoted lund. In the famina of 1899-1900 a large number of cattle died in the district, but this mortality did not tell upon irrigators as lu irrigoted londs the cultivators had reaped the usual khondya and kodyal orops for their cattle and caved them.
  - (3) Insufficient supply of manure. I de not think this would prove un obstacle.
  - (4) Unsuitability of soil (e.g., black cotton soil) to irrigation. In this district cetten soil exists in soveral tálukse and irrigated crops are grown in it. Generally speaking, the soil of the plain is suited to irrigation.
  - (5) Uncertainty of water-snpply. There is something in this. Canols and reservoirs not fed direct from the miny regions of the Ghonts are alreys liable to give out early, and well-sinking is nlways somewhat of a speculation in the Decean. Even where weter is found, it not unfrequently rans short in seasone of drooght.
  - (6) Capital would have to be berrowed for the most port. Whether it would be procurable would largely depend on the extent to which Government could give tagai and on the effect produced by the recent amendments to the Land Revenne Code. These latter will for a time canso a lock-up of lesnoble capital.
  - (7) Fear of enhanced rent or revenue assessment does not deter or discourage irrigators from oxtending irrigation, as they are willing to pay n proportionate share of the preduce they reclize from improvements.
  - (8) Uncertainty of tenure or defects of the Teooney Law.

The tensney in this district is the Alirási tenure, under which the cultivators have no feor of their lond clisnging hands except through their own funlt in net paying the assessment or incurring debt. Caness 5 and 6, viz., the uncertainty of the empty of water, otc., or lack of copital, expenditure, etc., have, however, often acted as obstacles to the extension of irrigation.

- 4. In section 107 of the Land Revenue Code provision has been made to safeguard the improvemente made by cultivators to their own leads at their own expenses.
- 5. Losns under the Land Imprevement Loons Act are taken freely fer the extension of irrigation by 'the people who cm furnish security, s.c., generally by those whose lands are not mortgaged, etc. I do not recommend any of the messares (1) to (6).
- 6. The extension of irrigation does not tend to injure the remaining collivation by attracting its cultivators to the irrigated tracts. Still I have no doubt that the people of this district would welcome the extension of means of irrigation to their unirrigated land.

- 7 and 8. The irrigation increases the value of the produce of land-
  - (1) by rendering it possible, to cultivate two harvests instead of one;
  - (2) by leading to the substitution of more far less ' . valosble crops er varieties;
  - (3) by increasing the yield-
    - (a) in a year of ample rainfall;
    - (b) in a year of scanty rainfall;
    - (c) in a year of drought.

It is difficult to say to whot extent sxactly irrigation increases the value of the produces of the land, but from local inquiry it uppears that in the first ease it increases from 50 to 100 per cent.; in the second from 25 to 75 per cent.; in the third (a) from 25 to 50 per cent.; in the third (b) from 40 to 75 per cent.; ond in the third (c) from 50 to 100.

I can give no trustworthy estimate on this point.

9. The annual rate per acre paid on account of irrigation by the owner of land to Government varies from Rs. 6 to Rs. 20. This rate is paid to the form of a water-rate and is recovered either along with the rent of land or separately as irrigation revenue.

The annual rate per acro paid on account of irrigation by the cultivator to the owner of the land varies from Rs. 10 to 25. In these cases the rate is not payable on the area actually irrigated during the year. The cultivators and owners of land fix a sum of enuol rent by mutana agreement on one or more survey numbers contoining irrigated and unirrigated land, and the agreed amount of annual rent is paid by cultivators to the owners of land.

In reference to the cause in charge of the Rovenou Department, the rate fixed by the Survey Department is poid annually. This rate is not changed during the period of settlement.

With reference to the canals in charge of the Public Works Department, the rate for water is paid according to the rates fixed for each kind of crop sown in a particular area and not for whole numbers, etc.

10. The extent to which privite expenditure is necessary to bring water to the field or to prepare any land for irrigotion is dependent on the quality and situation of the land.

This expenditure is generally incurred by the landlord in the first instance, but when it is incurred in special cases by temants the period of tonnecy is comparatively longor without a preportionoto incresso in the rental, which secures bim against losses.

- 11. No appreciable domage resolted to the people or deteriorotion to the soil from irrigation without manner, from too profuse or too extensive irrigation in this district.
- 12, 20 and 21. (1) Conals or groups of conals of intermittent flow in the Nasik district are supplied with woter from nolas, across which temporary doms are thrown up by the rayate at their ewn expense and the channels are also kept clean by thom.
- (2) The irrigator is allowed to take water upon the condition that he does so without stopping or injuring the current and only when his turn comes. Turns are fixed by the village panch. No instances have come to native in which the rights are mismmoged in only one village, though there have heen cases in which two oramore different villages have disputes about the proportions of water to he taken by each, and the Civil Courts are a sufficient remedy ogainst these.
- (3) (a) In years of ample rainfall water is maintained generally from November to February

Ronus.

- . (3) (b) In years of sennty rainfall it is maintained from November to the oud of December.
- (3) (c) In years of drought during November (if the naise continue to flow) or perhaps only during September and October. .

Answers to queries Nos: 13 to 19 may be deduced from the answers to Nos. 7 to 11 above mutatis mutandis, though the advantages of an intermittent flow must of course be less than those of a caual of continuous flow.

22. There is no necessity for encouraging and assisting the construction by private persons of further canala, as wherever there is a possibility of extending or introducing irrigation in any locality by kacha dams the people have never neglected them.

Where, however, tacha bandhams are necless, puere ones are beyond the power of the rayats; and I have observed in several places pueca dams which have silted up and become nseless.

#### TANKS.

Nov. 23 to 33. There are only two irrigation tanks in the district (Waghad tank and Pared tank), but no direct use of the water of the former tank is made for irrigation.

It is a storage tank supplying the Palkhad bandhara, from which the water is distributed for irrigation by channels.

In the case of Paraul tank the water is supplied direct to three villages of the Malegam Tolnka by menns of a channel.

Both the tanks are formed by damming rivers. The chief source of apply is the floods in the rainy seasons.

The water of the Waghad tank and its tributary channels does not generally fail even in years of drought, though of course it is much list in these years; whereas the Parsal tank rans dry during years of scaoty rainfall vory soon after the monsoon is over.

24 to 28. See replies above mulotis mulnadis.

29. The expenditure is home by the tenant.

The management of the canals is entirely in the hands of the Irrigation Department, and the Irrigation Act is cofficient for all practical purposes.

31 and 32. There are no private tanks, and none can be assisted or expected.

83. Can best to answered by officers of the Irrigation Department.

31. The district of Nasik is divided in two parts, plain and billy.

There are very few permanent walls useful for irrigation in hilly tracts.

The following information relates to the wells in plain

(1) The depth of permanent wells varies from 15 to 40 feet.

- (2) The nature of samply is generally from springs, Mr. A. R. but these near rivers and nalas or tanks get supplies by percolation also.
  - (a) In an ordinary year it is not generally liable to
  - (b) But in years of drought it is liable to fail, or at least to get low in many wells.
- (3) The cost of coestruction varies from Rs. 400 to Rs. 1,200.
- (4) The duration of a well varies from 10 to 40 years.

  The duration is chiefly dependent on construction. There are come wells said to be 100 years
- (5) The water is usually raised by means of leather buckets, called sacts, drawn by two ballocks.
- (6) The average area attached to and commanded by a well is three acres.
- (7) The average area irrigated in an ordinary year is about three acres, and in a year of drought about one acre.

Answers to Nos. 35 to 37 will be found above (7 to 11), although irrigation from walks is less liable to produce water-logging than channel water.

- BS. Seriene difficulties are encountered-
  - (1) in the selection of a spot in which a supply of water will be obtained;
  - (2) in the actual construction of well, as the cultithe actual construction of wen, as the cuntralors or experts in villages have an oye for such springs and do not generally fail. The average village mason is fully competent to build an ordinary well. No assistance has ever been offered by Government or by local bodies in the chape of expert advice. In the last in the shape of expert advice. In the last famine tagai was given only to those owners in whose fields trial shafts showed water. This district po-sesses a boring apparatus, but I am not aware to what extent it was used in the famins of 1890-1900.
- 39. Under the recently introduced non-alienated tenure, Government may with advantage construct wells in private lauds, but not in lands held on the ordinary toute. The construction might be iffected either by tagai loans, or else in the same way as ordinary public works.
- 40. Temporary wells are not commonly used in this district. They are not a protection against drought us the soil is annuitable for any except pueca wells. In a few places bloudlis have been dag in the beds of nales, but they are of little use in times of drought when the sunles do not even provide sufficient drinking-water for men and entile.

Statement showing the average rainfall in each month of the year.

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Mr. A. R. Bonus. III.

Supplementary Note on point No. 7 of the Memorandum of points to be considered by the Indian Irrigation Commission.

Total area irrigated-

				Acres
(a) in ordinary years	•	•		81,472
<ul><li>(a) in ordinary years</li><li>(b) in years of drought</li></ul>	•	•	•	91,200

The former figure is an overage for five years from 1891-92 to 1894-95, and the latter is also an average of two years, viz., 1896-97 and 1899-1900. In the former year 108,385 acres of land were irrigated and in the latter 74,086 acres only. The water-enptly was abundant in 1896-97, while in 1899-1900 it was scanty. Number of new walls constructed annually during the last ten years

1892	•	•	•	•	. 241
1893			•	•	. 189
1894	•		•		. 190
1895		•	•	•	. 290
1896					. 718
1897			4	•	. 1,655
1898			•		. 558
1899					. 987
1900	•				. 955
1901		,	•		. 1,089
					-
					6,855

Construction of wells was assisted by Government to the following extent:—

Advanced for constructing wells in 1899-1900 . . . . . 1,34,241 . Advanced for constructing wells in 1900-1901 . . . . 1,26,452

No concession other than that loid down in section 107 of the Land Revenue Code is given to the constructor of new walls. Till the expiry of the sottlement for the time being in force no water-rate or hagait assessment is levied on land irrigated from new wells in a survey number. Though it is desirable to stimulate the construction of new wells by more liberal advances or inducements, it is not practicable under existing circumstances to do so to any great extent. Under the present rules for granting tagal which require substantial scentity, comparatively few grants can be made. There are no trustworthy dots to show the extent to which wells were affected by successive droughts for 1899 to 1901.

Last year, Mr. Moore, whils on tour in Môlegaon, collected statistics of wells that had run dry. In six villages out of 329 wells, 240 had become dry hy the middle of December 1900.

Most of the wells which had run dry were deepened, and the results were partially successful, a temporary increase of supply being obtained in about three cases out of every four.

The average distance of water helow surface level varies from 10 to 30 feet and, the cost of wells used for irrigation varies from Rs. 400 to Re. 1,200.

The area served by each irrigation well in normal year varies from 5 to 15, or in rare cases 20 acres.

#### (4) Mr. R. A. Lamp, I.C.S., Collector, Ahmednagar,

Answers to printed questions.

Mr. R. A. Lamb.

I was Collector of Poona during 1897-1898 and of Ahmednegar from the end of October 1899 to the end of May 1901. I served as Assistant Collector in Khaudesh for about 61 years.

- 9. The uncertainty of the outply is a defect which, in my judgment, applies not only to wells and village works as Mr. Bronden points ont, but also to all works which are not fed from an area of assured rainfall. As yet there are no works in the Nagar District which are so fed. I submitted some months ogo a separato report to Government indicating where I thought such works might be constructed [Question 3 (5)].
- S. I am doubtful of the propriety of granting any remission in the case of failure in the attempt to obtain water [Q. 5 (4)] and of moking Government grants-in-aids of private wells [Q. 5 (6)].
  - 4. Question 6 (1) No.

(2) No.

(3) Yes.

- Section B. There are none in Nagar. The immense value of such canals was very manifest in Poona in 1806-97, to anyone passing through the villages, nuder the Nira Canal.
- 6. Section C. Under this section fall not only the village works regarding which Mr. Breudon has furnished information, but also the Ojhar and Lakh Canals which are Public Works Department works. The uselessness of these canals in years of scauty rainfall and of drought will be cured when the Makaladeri tank is completed. I concur generally in what Mr. Breudon says regarding village works.

- 7. Section D Q 23 (1). One Bhatedi tank is supplied with water by the surface flow of several nales all lying within the area of uncertain rainfall.
- (2) The water is distributed to the land by canals and
- (3) (a) I do not know.
  - (b) The supply ceases before the end of the cold weather, earlier or later occording as the rainfull is more or less scanty.
  - (c) In a year of drought there is no supply.
- (4) The area irrigated can be obtained from the records.

  8. Q. 2.—I have no knowledge of the working of the tank in a year of ample rainfall. In years of seanty rainfall one crop may be raised on a restricted erea or there may be no crop. I do not think that canal-watered land is ordinarily watered from wells also. (Q 26). There are not to my knowledge any tanks constructed by private persons, nor is it necessary to encourage such construction (Qs. 31 and 32.) The tank silts up badly. (Q 33).

  9. Section E. I concur generally in Mr. Brendon's report on wells. I do not consider the extension of well-digging a
- O. Section E. I concur generally in Mr. Brendon's report on wells. I do not consider the extension of well-digging a sound protection against fomine, because in years of drought or of continued soanty rainfall the subsoil water falls so low that only a restricted area or none can be irrigated in the fomine years, and because the tendency is to allow all but the hest wells to full into disuse during years of good rainfall, so that when famine comes a considerable or great number of constructed wells are no longer nvailable for irrigation. The selection of a spot in which to sink a well is largely a matter of luck (Q 38). I do not think it is the business of Government to sink wells in lands which are private property, or in occupied louds.

(5) Mr. B. P. Milson, M.I.C.E., Executive Engineer, Sholdpur District.

Answers to printed questions.

Mr. B. P. 2. The character of the soil of the district, generally speaking, is muramy in the higher-lying portions of the district, with black soil in the valleys.

The average rainfall is shout 20 inches.

The crops that require watering are-

- (i) Perennial, such as sugarcane, plantains, gardenland, etc., require water all the year round—36 to 48 waterings.
- (li) Eight months' orops, such as superior class rice, ground-nut, chillies, onions, tobacco, and tur,
- require water from June to January-about 16 waterings.
- (iii) Monsoon dry crops, such as bajri, maize, dry rice, rala, require water from June to October—3 to 6 waterings.
- (iv) Rahi crops, such as jowari, wheat aed gram, require water from October to Jonnery—8 to 10 waterings.
- (v) Fodder requires water from January to June-10 to 15 waterings.

. .

Distribution is controlled by Departmental Agency, there being karkons employed one for overy 15 to 20 miles of canals, and nudor them Patkoris, one for from 5 to 10 miles, occording to the oxtent of irrigation onticipated; the whole being under the supervision of the subordinate in charge of the tark in charge of the tank.

The revenue is realized by the Civil Department on figures furnished to thom by the Public Works Depart-

3. The undersigned has had very little experience of tanks constructed in black-cotton soil. There are a number in the district, but all so small as to be more in the nature of pends than tanks, holding not more than 3 to 5 feet of water, and chiefly used for watering cattle, etc.

So for as undersigned can offer an opinion, it is that high earthen dams cannot be constructed of black-cotton soil alone, and even with masonry core walls, would not be likely to prove satisfactory.

In black soil there is no demand for water, except in cases of prolonged drought, and in cases where a large area of such soil is under command, the revenue is more precarious than in eases of tonks commanding other classes of

So far as undersigned is aware there has been no desire shown for irrigation works on the part of owners of black Roil.

4. Descriptions of existing Government irrigation works and their tofol annual irrigating opacity have been farnished to the Superintending Engineer on special duty, and will, coubiless, he furnished to the Commission by that officer.

In the cases of all four of the tanks in operation in this district, vie., Mhasvad, Ekrak, Ashti and Koregaen, it cannot be said that they can be depended on in a season of drought, as during last year very little irrigation was possible from any of them (compared with what they should be capable of) on account of short storage of water.

- 5. Cannot answer.
- G. Connot answer.
- 7. Connot answer. The Collector will probable to ablo to give this information. In the epinioniof the andorsigned, it is most desirable to stimulate the construction of new wolls in every possible way.
  - S. Cannot answer.
  - 9. Relief labour was employed on-
    - (i) Improvements to reads and metal-breaking.
    - (ii) Railways, earth-work and ballast-breaking.
    - (iii) Large irrigation works.

The amounts expended on each class will be intimated Actor

Of the incompleted large irrigation works, the undersigned considers that it is most desirable to complete Pathri and Wadshivna tonks at once : the estimated cost of these is—

•	•			Rs.
Pathri		•	٠,	1,22,000
Wadshirma				40.000

The following sams have been already speat on those two

				Rs.
Pathri		•		8,29,000
Wadahiyna	•	•	•	1,71,000

and so long as they remain incomplete, no benefit is obtained from this large expenditure, and the work already done must deteriorate very considerably.

If completed, it is probable that these works would Mr. B. P. mitigate the effects of any future famine in their immediate vicinity, and in the case of Pathri, it would also render possible a permanent water-supply to Barsi town, where the present supply is, at times, very far from adequate.

Moreover, the work romaining to be done on these two tanks is, most of it, not suitable for the employment of fomine labour, it being, for the most part, the completion of outlets, capals, etc.

The sums mentioned above as having been spont on and being required to complete Pathri and Wadshivna tanks, show the vulue of the work at normal rates.

12. (i) and (ii). Information on these points from 1891-92 has already been furnished to the Superintending Engineer on special daty, and he will, no doubt, sapply it to the Commission. A statement, so far as information is evalleble, for years previous to 1891-92, accompanies for works now in operation.

13. The scale of water-rates is as follows :-

		Uh t	iol ank			kro			ihi ink			rcg no k	1011
		R	۵,	p.	R	۵,	p.	2	a.	p.	R,	6.	p.
Perencial crops	•	12	0	0	10	0	0	12	0	0	٥	0	0
Eight months' crops		4	0	0	4	0	0	4	Ô	0	2	ð	0
Rabi crops		2	0	0	2	9	0	2	0	0	2	Ð	0
Monsoon dry crops		0	12	0	1	0	0	0	12	0	2	0	Ð
Hot weather crops		0	0	0	ß	0	0	4	0	0	2	ð	0

Applications for woter are received annually for porennial crops, and for others, during their seasons. Applications are entertained in order of receipt, so long as woter is avail-

In years of favourable rainfell the demand for irrigation, and, it also follows, irrigation revonne, falls off very con siderably, and the effect on the following year depends ontirely on the mensoon intervening.

Tanks are not, by any means, always empty at the end of the irrigoting season.

Undersigned finds it diffioult to orrive at a conclusion as to whether irrigation works got a fair credit for the increase of revenue due to their construction, for there are so many indirect advantages that dwellers in the violaity enjoy; but on the whole he is mable to show that they do not

Charges for maintenance ond establishment are quite foir; no one is employed on snything but the tank concerned.

The question as to whether the Rovenno Accounts may be accepted as correctly indicating the financial results nttained by each work, depends, to some extent, on whether each work is considered to get a fair credit for the increase of revenue due to its construction: if it is thought that this is the case, the Revenue Accounts may be accepted as correctly indicating the finencial results attoined,

14. Undersigned is of opinion that three, at least, of the irrigation tanks in this district (he has no knowledge of Koregaan) did, to a considerable degree, mitigate the offects of the recent famine in their violatry. As to the other points embraced in this question, the Collector of the district is in a better position to roply than the undersigned.

In conclusion, undersigned would beg to state that his experience of irrigation works is so very limited, that he ventures to suggest that the Commission will kindly bear that fact in mind whon considering his memoranda.

Milsom

Mr. Il Il. Milion

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Mr. B. F. Milsom.

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of Tank,	Year,	through the slutees,	leakage gauged.	at the end of the year.	stored during the year.	ran over the waste Welr.	ran-off for the Jear.	Tolui rainfail.	over rainfall of the year.	Khatif.	Rabi.	Tolal.	Theoreti- cal cubic feet per second.	Actual n	ber secon uezjanus	cubla d.
r	1				.:			Ins. cts.	·	Acres.	Acres.	Aeres.		Right Bank Chaunel.		
Koungton Tank-coolloued.	1891-62	45-72 37-21 47-50 37-62	The leakage from this tank dam posses to the edla, where it is pleked up and niffed for irrigation,	05.03 Not available.	152-196 Not available.	Not available.	61:69 123:80 121:00 121:00	518-00 237-00 571-97 286-23 211-53	0.333 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403 0.403	13 Not and 151	S S S S S S S S S S S S S S S S S S S	9 qe  vav 10N 178 195 275 230 226	Right Back Channel - 4 21 per second.	3.70 2.01 3.70 Telf		101 101 101 100 100 100 100 100
Aent Tine.	1871-72 . 1872-73 . 1873-74 . 1874-76 . 1875-76 . 1876-77 . 1877-8 . 1878-79 . 1870-80 . 1850-81 . 1862-83 . 1863-85 .	Not available.	20.05 20.05 Not arailablo.	74.02 20.031 70.04 aveilable	Not available.	Not available.	Statistics Not available.	8,010°45 Rat 1,437 59 4,897°17	C.137 Examinable, 0.010 0.512	Not a	raliable.	715 245 250 245 245 245 245 245 245 245 245 245 245	Left Bank Conal 30.00	Bank Canal.	8:ght Bank Canal.	
	1885-86 . 1886-87 . 1887-83 . 1888-80 .	35-07 127-72 , 103-31 263-03	23-03 23-03 23-03 23-03	633-78 633-88 611-83 318 60	\$98.78	Not flowed.	1,200-77 1,030-53 742-00 336-78	6,214°23 4,335°03 3,603°56 6,358°52 4,501°25	0°105 0°170 0°107 0°217	405 445 686 890	334 23 873 1,437	738 769 058 2,417	i iii	6.73 0.51 11.80 10.90	2'46 3'50 5'31 0'11	100 400 400
(	1859-90 . 1890 Pl .	243·40 180·71	23 02	780°20 748 03	***	***	1,389·53 499·39	4,501°25 3,869°86	0.108	829 878	618 548	1,447	)	10.09	3°00 4'23	

Statement showing the expenditure incurred on Famine works in the Sholdpur District up to end of September 1901.

,	1896-87.	1807-98,	1895-99.	1690-1000.	1900-1901.	1001-1902,	Total.
I—Improvements to roads and metal- breaking.	100	,	•••	4,15,307	3,28,929	1,240	7,45,476
II—Railways; earth- work and ballast- breaking.	414	* •••	***	1,05,285	8,70,095	2,118	4,73,262
III—Largo Irrigation works.	14,839	6,03,228	1,68,017	6,70,88L	15,74,920	6,80,451	36,06,83
IV—Village tanks	644		,,,,	1 444	668	15,306	15,974
V-Miscellanoous .	•••		•••	***	475	PET ,	478
1							١,

Mr.Gokhale. (6) Mr. Nilkante Govind Gonhale, Retired Assistant Engineer, 1st Grade, Irrigation Department.

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#### Answers to printed questions.

#### A .- GENERAL.

1.—The Decan districts and Gnjarát, Poona, Satára, Nagar and Násik, Sholspuz, Khándesh and Belganm. I was in charge of some of the principal irrigation works in the districts named above. I aurveyed come, constructed and managed others, especially the Krishna canal works from the beginning to the and; Chikhli canals; Mhasad tank canal No. 2; Mayani tank and canal; Yerala water works; Ner tonk; Mutha canals (Ponna); Lakb and Ozar canals (Nagar and Násik); Ikruk tank nod canal (Sholspar); Jamda canal; Hartala tonk and umal (Khándesh); Hatmati canal (Gujarát); and other old petty channels. I have also inspected the Ganges canal and the Káveri canals and compared the existing systems of irrigation in those provinces with that which systems of irrigation in those provinces with that which obtaine here

- 3.-(1) Yes. On an average the labour of three porsons per aere is available under command of the Krishna canal (Satara district), while the labour of only one man is available for 26 acres on the Lakh and Ozar canals (Nagar and Násik districts).
- (2) Yes. There is an insufficient supply of cattle for want of grazing land free of charge or at a moderate rate. When there were no stringent rules of the Forest Department, people had large numbers of cattle, but since then the number is reduced to a minimum.
- (3) Yes. Inadequate supply of cattle has naturally cortailed the scores of manure. Even bones are experted.
- (4) Yes, to a certain extent; but this can be partly remedied by an abundant supply of manuro in black cotton
- (5) Yes, very great obstoole: for crops fail and people are rained doubly. They lose their seed end labour and there is no prospect of a erop. By too late commencement there is an antimely outply of water, which only becefits late crops. Too carly occasion is also ruinoos, but it can be partly remedied by a profuse use of cowdung and osh
- (6) Yes, it is. In the first place, the cultivators are too poor to opend. In the second place, if some of them have money, they are afraid of spending it for fear of enhancement of water-rate and also land assessment. Some may have funds to spend on expensive cultivation of irrigated crops, but they are afraid of the uncertainty of timely and sufficient water-supply. Also they fear that the return they expect is not proportionate to the fitful enhancement of rates, which they anticipate on account of the nucer-tainty of land tenure. They, therefore, naturally wish for a permanent settlement.
- (7) Yes, quito so. They heartily wish for a permanent
- (8) Yee. Uncertainty of tonnro discourages coltivators to spond large some of money on land improvement.
- (9) Poverty, wont of oredit with the Sawkars, ignorance, no improvement in the est old methods of irri-gntion, the rough conservatism, want of proper scientific directions by Government or poblic hodien or experts as regards varieties of manore appropriate to different crops.

#### 4.-No such exemption, as far as I am aware.

5.—As far as I am mare people do not largely take advantage of this loan for improving their lands for the following reasons:—They complain that they do not actually get the exact amount advanced and against the heavy rate of interest. Sometimes it impress that the advance made goes to recover arrears of land revenue. The terms on which the meacy is advanced are bord. The inte offered on promissory notes may be charged on the advance made. I would like to recommend one or more of the requedies pointed out in the question as individual cases. remedies pointed out in the question as individual cases permit.

6.—No case has some to my knowledge. Yes. There is a atrong desire to have irrigation extended. It is growing stronger and etronger on account of the unequal distribution of the rain and increase of population.

#### B .- CANALS OF CONTINUOUS FLOW.

It is true. Two crops instead of one rich crop, but they are of inferior kind and the laboor required is therefore greater. Hence there is no appreciable increase in the value of the produce of the

- (2) The answer is the same as for (1).
- (3) (a). If there is timely and ample rainfall, artificial irrigation does not increase the value of the yield. It is in that case absolutely superfluous.
- (3) (b). Yes. It is necessary even for a normal yield, and on necount of the failure of crops in unirrigated lands the value of the yield of irrigated lands is necessarily increased.
  - (3) (c) Much more so in the case of droughts.
- 8.-(1) The increase is in proportion to the difference between the value of indifferent crop and foll erop and vaties according to the market rates on the demand and sapply principle.
- (2) There is almost no irrigation in the Decean in a year of drought, nuless the canals are provided with supplementary reservoirs.
- -9.-(3) The rate per acre varies according to local circumstauces.

11.—Yes, damage results to both people and soil. By irrigation without manure the soil is epoiled, the salta occing out. By too profuse irrigation it is spoiled by anturation. By too extensive irrigation damage results on account of the inability of the cultivator to bestow on his land adequate labour and mesonra. By too frequent irrigation the soil deteriorates for want of a sufficient empty of manure. From water-laysing the salts in the soil come up manure. From woter-lagging the calts in the soil come up nund sale efforescence damages crops and soil. This can be remedied by proper drainags. The extent of the damage depends on the local circumstances. Inadequacy or excess of any one particular thing is sufficient to damage the crops and spoil the land. The Krishna canal irrigation is of over 20 years' standing, and the svil stood for nearly years or more until it was minimised by drainage; and this I say from my own personal experience of the Krishna canal, the Mutha canal and the Gokák canal.

#### C .- CANALS OF INTERMITTENT FLOW.

15.—Well-irrigation is taken advantogo of only during the periodical cosmion of water from the canal. This is absolutely necessary to save crops when the cosmion extends over a number of days.

21.—As far as I am aware no private persons have constructed hig canois, nor are they allowed to do so by Government.

22.—Yes. This could best be done by encouringing private capitalists under cortain guarantees as in the case of certain Italiway Companies. When the capital so invested is paid off with interest at a fixed rate, the property in the cause must lapse to Government, the difference between the present revenue to Government from unirrigated land and the revenue after irrigation being paid to defray the enrrent expenses and those of construction,

#### D. - TANKS.

#### 24 to 32.—There is no appreciable difference.

33.-There is some inconvanience in as much as no water can be stored up for enlitivation on one hand, but, on the other, nilovial soil is some gain, though with a small reduction in area. The silt is not removed by dredging or otherwise; as, for instance, the Katraj tank (Poona) and many n tank in the Madras Prosidency and Mysore. No a steps seem to have been taken anywhore to remove the silt. It can be economically romoved by famine labour.

34.-In the Decean generally-

- (1) The average depth of wells is from 16 to 40 feet. .
- (2) The natural sopply is from spriogs and they are fed by percolation.

In ordinary years it does not fail or become so much saline as to be useless for oultivating crops, e.g., chilli crop which yields better crop by saline water.

- (3) That depends on the nature of the ground; generally it requires Rs. 500.
- (4) Permanent. It, however, vories according to the
- (5) By a mot—a large leather bag holding about four to six cubic feet of water, or a Persian while or seconing.
  - (6) Two to five acres according to local facilities.
  - (7) Two to five ocres.

. 37—(2) From annes 8 to Rs. 4½ per acre over the assessment for a jurnit acre fixed by Survey Sottlement necording to the capacity of the well. The rates are paid on the arch attached to and commanded by the well.

38.—(1) .Yes. There are professional men called Pánabude, who pretend to know the under-corrects of water. No boring is taken, and many people have therefore to lose labour and money spent on a well.

39.—(2) Difficulty of finding monoy. None that I am aware of. Gratuitous help is never given. Free use of tools and implements with free labour is the only inducement to make it successful, and when successful a certain percentage of the total cost may be borne by the collivator.

· 11.

Supplementary Memorandum of Evidence to be given before the Irrigation Commission.

Large works like the Mutha canals have done great good, but much water is lost by perceletion from the carals; and it can he picked up with great sdvantage. I have suggested such pickup-weirs, large and small, when opportunities occurred for so doing while in service. I suggested, for instance, a pickup-weir for using the waste water from the Gokák Mills in my report at the close of my service. The water-supply to the Gokák Mills runs waste, and it is so great that a canal may be maintained out of it. A

pickup-weir below Mhaswad Canal No. 2 was also suggested. A small pickup-weir to divert wntor from n Nnlla in Vadgacu Budruk into Mutha Canul was suggested. Small pickup-weirs on Vithalwddi Nulla and Nana Sankarshet Nulla below Mutha right bank canel were constructed, and so much water was saved. I recommend that pickup-weirs, wherever possible, may be constructed on the system of Khandesh Class II Irrigation Works. The works can be entrusted to village communities, and the maintenence charges would be small. I now suggest a pickup-weir on the Mula Mutha River. There is already a weir constructed for the Bund Gardon, and it can be utilized for making a left bank conal from the weir.

2. I also recommend the construction of small tanks, not so much for irrigation direct but for feeding wells, by increasing the underground supply. I was in charge of the Islampur water-supply tank. In addition to the direct use it serves, it has made the supply of wells below it unfailing, and people are greatly benefited. I recommend, therefore, that small tanks, wherever possible, be constructed, as they will give useful work for famine labour near the homes of famine-stricken people, and be a permanent benefit to the country.

3. My experience is that the sofficiency of water in the Krishna canal largely depends on the rainfall at Mobdbaleshwar. Whenever there is 300 inches or more of minfall there the supply is ample, but when it is less the supply is proportionately reduced. A storage tank, therefore, will improve the prospects of the canal which are already good.

(7) MR. NABATAN VENEATESH CHANDAVAREAR, Mdmletder of Bedemi, Bijapur District.

Answers to printed questions.

1

#### A .- GENTEAL.

- 1. The following answers refer to Hijapur district and I have answered them from my experience as a Mambatdar.
- 2. The average roinfall in each moath of the years 1900 and 1901 is given in the following statement:-

Statement showing the average rainfall in each month of the years 1900 and 1901, Taluka Badami, District Bijapur;

Years	,	- January.	February.	April.	May.	July.
1900 .		0·0 0·02	0 0 0 0 0 0 1 0 0 1 0 1 0 1 0 1 0 1 0 1	0-60 0-77	1·73 3 · 2·57 3	48 2·61 01 053
Yeara.	Angust.	September.	October.	November.	Desember.	Torat.
1900 1901	1·34 0·73	4·60 0·78	2·67 2·97	0.0	00	17:30

- 3. There is obstacle to the extension of irrigation arising from—
  - (3) insufficient supply of manure. The only manure now used is of cowdung. The ryote are not allowed to get leaves from forcets, besides there are no trees in the forcests, the leaves of which can be used;
  - (4) unsuitability of soil (black cotton soil) to irrigation, as the water of the tanks in such soil is likely to seak in;
  - (5) nnoertainty of the supply of water no the rainfall is very uncertain, and hesides this, there is no cortainty of finding water in the wells, if dug ont. The water is found in a well to p

depth of from 40 to 60 feet, and much exrense and labour to get the water for irriga- Chandarartion is required;

- (6) lock of capital for the initial expenditure or of funds for the more expensive cultivation of irrigated crops. There are very few among entitivating class in a position to spend a large nmount for this purpose. The other well-todo persons outlay their capital on interest, etc.
- There is no obstacle arising from (2) insufficient supply of cattle suited to the cultivation of irrigated land as they can be got in the district;
- (7) fear of enhanced rent or revenue assessment.

  Generally no amount is spent by the tenant on the lands belonging to the owners. The owners of the lands get a fair amount of produce from the lands irrigated to pay off the assessment even if enhanced.
- (8) uncertainty of tonnre. Up to the passing of the Land Revenne Code Amendment Act the occupants of lands did not think of the uncertainty of tenure as they knew that the lands were allowed to continue in their possession for ever, although the assessment is liable to be altered after a period of 30 years; but I think the occupents would heatate to spend on this account, as there is no gnarantes under the Land Revenne Code Amendment Act that the lands onea forfeited would be restored to them without fail and to no one olee.
- 4. No enhanced assessment for lands irrigated subsequent to the original Enrey Settlement is levied up to the expiration of the term of Settlement (30 years). Generally no tenants spend anything at their own cost for lands leased to them by the owners. The existing provisions in respect of usussement are not sufficiently liberal. I would respect fully suggest that if the lands not formerly irrigated are once assessed, they should not be liable to any enhanced assessment if they are irrigated at the cost of the occupants.
- 5. Loans under the Land Improvement Act nre not freely taken by the people for the extension of irrigation, as there is no certainty of water being found in wells and generally the black soll is not suited for tanks and the rainfall is nacertain.
- (1) The reduction of the rate of interest and (2) remission of the interest would not encourage the ryots to obtain

Mr. Gokhale.

Mr. Chandavarkar.

tagái loans for soch purposes. (3) Partial rombsion of the advance and alec (5) extension of the period of repayment (both in one and the same case) and (4) total remission in case of failure would, to some exent, encourage the ryots to obtain loans.

6. It is true that the ryots are sure and certain that they would get a fair portion of produce in the fields to be irrigated even if there is no rain. Still I do not think that the extension of irrigation would tend to injure the remaining collivation by attracting its oultivators to the injured tracts. irrigated tracts.

The rainfall in this district is very uncertain and there are very few wolls or tanks having natural springs, and the water-supply is thoroby scenty and consequently the people desire to here means of irrigation extended at the cost of

I would further soggest for encouraging the ryats to oteln tagái loans that if lands are farfeited under the Land Rovenne Codo Amondment Act, there should be a graroutee that they should he restored to the owners of the land without fail and to no one clse.

#### D.-TANKS.

23. There are some tanks in the Badami Talnka; the names are given below :-

- (1) (a) Halo Mahakooto Houd in Gowanki village.
  - (b) Arakeri in Nilgond village.
  - (c) Banshankri Houda in the village of Cholachgud.
  - These tanks have natural springs of water.
  - } in the village of Tim-(d) 1. Dodakori 2. Sannakeri
  - (c) 1. Irawakori 2. Gonjikeri in Khanapur village.
  - (f) Tank in the village of Kendur.

These tooks are filled up with water during mouseon, het have no natural eprings.

- (2) Government have fixed certain rules for regu-lating the water-supply that each khâtedar should take a certain quentity of water for a certain period.
- (3) The tanks which have natural springs of water e takes when nevo natural springs of water oupply water to the leads under their com-mand all round the year in a year of amplo rainfall, in a year of ecanty rainfall and also in a year of drought.
- The tanks in the villages of Khanapur and Kendur emply water for a period of uine months in a year of ample minfall, four months in a year of scanty rainfall, and in a year of drought the water is not sufficient even for one barvest.

The tanks in the village of Timesgar supply water far a period of nearly four months only in a year of umplo rainfall.

(4) The area irrigated from each of the touks is given helow :-

			Arra.		Assersmen		ıt,
			٨.	G.	Rs.	a.	p.
(a) Hale Mahakoote	Hon	d	14	16	98	0	6
(b) Nilgand Arkeri			3	15	11	1	0
(c) Cholachgud Bana	shanl	kri					
Houd .		•	40	14	295	12	0
(d) Timesgar—							
Dodakeri			7	214	295	12	0
Sannakori			84	39	91	9	11
(e) Khanapur-				ŧ			
Iranakeri			82	2.	353	9	0
Gnnjikeri			44	19	136	0	0
(f) Kendurkeri	•	•	256	16	1,436	13	6

26. The irrigation is not ordinarily supplemented by irrigation from wells given to the same land

- 28. (1) There are no canale owned by private persons.
- (2) The average annual rate per acre paid on account of irrigation to the owner of the land by the tenant is double the produce generally to be got in fields not irrigated.

- (3) Generally the highest rate per acre far Khuski land is Rs. 1-4-0. It will be seen at what rats the owners of the lands are required to pay to Government in the form of cahancement of revenue, etc., from the amount of resessment given against the area irrigated and shown in purgraph 23 (4).
- 29. When lands are leased out to a tenant, it is generally decided that the tenant shauld spend any amount that would be required to bring the water to the field or to prepare that loud for irrigation. The expenditure in this connection is very small, as no channels to flow water are constructed with atones, etc. This sort of labour is taken into consideration in fixing the amount of rent.
- 30. The maintennace is generally done by the Public Works Department. The approximate amount of cost per aero irrigated cannot he given, as there are no records. Every year such repairs, etc., are not executed by the Public Warks Department.
- 31. There are no tanks constructed by private persons in
- 32. I do not consider it advisable to encourage and assist the construction by private persons of further tanks, as there is no certainty of woter being found, and the ryots would not undertake to construct such big works.

#### E .- WELLS.

- 31. (1) The average depth of permanent wells is from 40 tn 60 feet.
- (21 There are very few wells having natural springs in this part of the district. The water, if found in a well, is brackish and is not at all cultable for irrigation.
- (3) The average cost of construction is from Bs. 1,000 to Rs. 4,000.
- (4) The average duration of a well is for a period of 20 or 25 years. Subsequently the construction work will have to be repaired.
- (5) The water is generally raised by the assistance of cettle. A leather bag containing some 4 or 5 gallons of water is prepared instead of ghada and is used for drawing water from the wells.
- (6) and (7) The average area insignted is nearly 8 acres
- 37. The average annual rate per acte paid on account of irrigation is Rs. 2-3-0 on account of gardees by the owner to Government, and Rs. 10 to the owner by the tenant. No paddy or jowari crops, etc., are raised here by irrigation from wells. The only produce reliable is raised by the use of water from wells is vegetables and sugercane, etc.
- (2) Nothing is paid to Government by the owner in the shope of enhancement of revenue if wells are dog out after the original Survey Settlement is introduced till the settlement period is over

These rates are paid on the area actually irrigated by the tenonis to the owners and by the owners to Government on the total area commanded by the well.

39. Serious difficulties are often encountered in the selec-39. Serious dimenties are often encountered in the selec-tion of spots in which a supply of water will be found; but none in the actual construction of the wells. I have not seen my instances in which assistance was affered by Government ar local bodies in the shape of expert advice. In some places there are experts who celect sites where water can be found, and their advice is generally acted up. It is can be tound, and their active is generally acted up. It is advisable to have a supply of boring tools in the centro of a district or in some convenient place for the use of the ryots of two or three talukas. The ryots who desire to make use of them should be given them free of charge.

39. I am not in favour of the construction by Government of wells in lond which is private property. To irrigate lands from the use of water from wells requires a large expenditure constantly to be incurred. This is not possible for most of the ryots to incur, and consequently the ryots would not like to have them in their fields.

40. The temporary wells are not used in this part of the district, and in a year of scanty minfall they will be of no neo for irrigation purposes.

It is most difficult to find out water in temporary wells enflicient even for drinking purposes.

3. If small tanks be constructed in hard black soil and not in soft black soil, water will hold in them, as water in such soil does not generally submerge; but earthen dams without mosoury core will be of no use, as black soil is easily washed away by heory fall of min. There is no demand for water during seasons of overage minfall, but only in case of prolonged dronght; but in cases of gardens, even in rainy season, there is always demand for water. The red soil requires constant rain or water from tanks, but in the case of black soil—if there has been once sufficient meiature to a depth of one and a half feet -no water from tank is required.

There are two tanks which irrigate black soil in the village of Timségar, but no water-rate is levied, os the use of water was taken into consideration when fixing the assessment on lands to be irrigated, and therefore it cannot be said that the irrigoted orea shows a falling-off in Jears of good rainfell and the revenue is precatious.

In this district the rainfull is very necertain, and consequently the owners of black soll would like irrigation works, and the construction of irrigation tanks for black soil is considered as remunerative as the crops in black soil grow more than those in red soil, and the produce such as rabi, jowari, cutton, etc., is sold at a higher rate than that in red seil.

7. I doubt very much whether the rrots would like to construct now wells by the use of tagai advances for irrigaling their fields, as wells require a very large amount in

this part of the district; besides it is not certain that they would succeed in getting water. Only few ryots who are Chandanar-well-to-do would like to construct wells eafely for the har.

purpose of gardens.

There ere some wells in some villages of this talka, the water of which is safely used for gardons. There was no scarolty of water in these wells during femine years of 1899—1901.

During the years 1899-1901 email same of Rs. 75 and Rs. 90 were granted for deepsning the wells, and the owners of the wells got a foir quantity of water.

Generally water in wells is found to a depth of 50 to 60 feet, and to dig out n well that would irrigate some 8 acres would require from Rs. 2,000 to Rs. 4,000.

- 8. In this taluka there are ue instances in which lande or crops ore injored by woter-logging, and no drainage worke ore required.
  - 10. I have no remark to offer.
- 14. No irrigation works were constructed during the famine of 1897 and subsequently. The famine relief works found necessary in the form of employment on relief works for those who con work, and of gratuitous relief for those who are unable to do any sort of work.

#### (8) Mr. R.-M. KENPEDY, I.C.S., Acting Commissioner, Sonthern Division.

#### Memorandum by Witness.

As the Commission has now arrived in the Southern Division, I have the honour to submit a short note on the needs of this division.

- 2. As I have received charge in the middle of November after an absence from India of 18 months, I am nuablo to speak from personal experience.
- 3. Belgaum District .- The areas liable to famino ·here aro-

The Athni taluka, the Gokek taluka excepting the pertion under Canal Irrigation, and the Parasad tainka including the Margod Petha.

To irrigate the above areas as a protectivo measure I would suggest as follows--

Athniand Gakik talukm (1) The present Gokak Canal may be extended towards Athnita meet the Krishna river to the

north, and (2) a rouel may be constructed from the Krishno so as to serve the eastern and northern villages of Atlank.

Bijapur District .- The whole of the district is liable to drought. The following works are suggested.

. The Sangogi tank under construction may be completed

For Ind and Sinds: the which will sorve parts of the Indiand Sinds: talkas.

The Buttary value which will sorve parts of the Indiand Sinds: talkas.

The Hulber tank under construction may be completed. For Bagawadt täluka (in part).

A canal may be constructed from the Krishna in the Bilgi For parts of Bilgt Peiha, Bijapur, Bagewall, Bagalkot and Muddebihal Makas.

Petha. For Padimt Hungand and Bagalkot talukse in part. A canal may be constructed from the Malaprabha river in the Norgand Petha of the Dharwar district.

Dharwar District .- The major portion of this district is ordinarily immane from famine. The parts liable are the Navalgund talaka Including the Nargand Petha, the Gadag taluka including the Mondargi Petha and the Ran

A canal constructed from the Malaprabha river Mr. R. M. in the Nargand Petha will serve the Petha itself, and Kennedy. parts of the Navelgund and Ron talakas.

I would recommend also the putting in thorough repair of all the existing tanks in this district.

I have italicised the works I consider most necessary.

- 4. Unless it is known what enms can be made available both in lump and annually it is impossible to recommend definite proposuls. Moreover, I am not aware that any definito schemes have been propared except that for Sangogi
- 5. On the Sangogl tank Rs. 2,44,000 hove been expended. The estinate provides for an expenditure of 12 lakhs.
- 6. Personally I would odvocate canal irrigation in preference to tank irrigation. It is true that generally there is some van, though owing to its being unscassemable there is scarcity, but searcity is generally accompanied by drought and ia the Bijápur district the total ramfall is often very insufficient. Under these circumstances tanks may fall when they are most wanted. Rivers, however, being dependent on the rainfall at the watershed where rain is alreast durays plantiful are not liable to where rain is almost always plentiful are not liable to dopletion.
- 7. Unfortunately the soil of most of the affected area is black soil which, as far as I have observed, is less suitable for irrigotion purposes.
- 8. Canol irrigation is, howover, successful in the neighbonring Satara district (in the case of the Krishna Cauel), and I am hopeful of good results in the Athni and Gokak tulnkas of Belgaum.
- 9. I doubt, however, the success of irritation works financially. The existing water-rates cannot, I fear, bear onhancement and to culture them would to make them unpopular. They would not, however, cause much loss ultimately, and that loss would be more than covered by the inercased prosperity of the people by partial protection from recurrent fommo.

## (1) Mr. G. L. MacGregor, I.O.S., Assistant Collector, Kanara.

#### Answers to printed questions.

- A. 1. (i) To the whole of North Kanara.
- (ii) I have had one year's tour in each division.
- 8. (1) The population is very sparse indeed except on the coast and on the Dharwar Mysoro hurder.
- (2) The cattle are of a vory small breed. Whore "weingan" rice is grown in heavy soil they use buffelors. In these cases the faud is flooded and then ploughed while under water.
- (3) Leaf manner is plentiful; owing to the comparatively small nambor of cuttle rich phosphates are not obtainable for any increase of cultivation.
- (4) The sell is sufficiently spitable.
- (5) The south-west mensoon is the only roul rainy Mac Gregor. senson; a few honey showers, however, fall in late April and early May. The rainy months are June to September. Latterly there has been a follure of rain in September.
- (6) All the cultivators are poor. The capitalists are few and none of them take the smallest interest in the improvement of agriculture. I do not think expense is any drawback. I fancy there ore few more expensive cultivations than gardon crops, ond .everybody is reody and anxious to turn his riceland into garden.
  - (7) I have not heard of such foar.

Mr. G. L.

Mr. G. L. MacGregor.

- (8) The tenant law ond tennre are all right.
- (9) The remain taw out termine and right:

  (9) The main objection to the extension of irrigation is the extent of jaugle. Very nearly all available land—except in the melarious ottip near the west of the ghuts io under cultivation and most of it under rice, an irrigated crop. The soft is not, I think, rich oneagh to grow anything else. On the stony hills "regi" is sometimes grown, but such land would not be suitable to irrigation and ragi is a dry crop.

#### I-BELOW GHATS.

5. Leans are generally taken by the people who live on the coast and principally for excluding water from their lands. A few wells are sank with the help of tagāi in the larger towns for the growth of mengo, jack, and coconnut trees in the gardens of the larger houses.

Tagui dishursed does not exceed Rs. 20,000 a year if it reaches that figure. The reasons are—

- (i) The ignorance and backwardness of the people which provents their doing unything which their forefathers did not do.
- (ii) The nutural water-supply is so extraordinarily good that irrigation is not in demand. The people draw and deflect the monatain streams on the coast at very little expense.

#### II-ABOVE GHATS.

In Haliyul and Muudgod the reasone irrigation is not extended are:-

- (i) The poverty of the people and the upathy of the Sawakar.
- (ii) I do not think many other sites are uvailable for tasks and there are no rivers to tap. I do not know the depth of the subseil water from the surface of the ground.
- (iii) As a rule, in each village there is one tank which irrigates some of the lunds, perhaps 80 acres on the average. These lands are in the hands of many holders. To improve the tank would benefit more than one holder and the cost more than a single holder will undertake. There are no philanthrophiets to undertake this work, and there is great difficulty in getting the people to take takevi on command guarantee. I do not know if it has been tried extensively, but I know of one case on the coast where matters came to a deadlock. If you go to a Huliyal or Mundgod village, they will ask you to improve their tanke, hot I do not think many villages will take takavi for it, as they seem to be under the impression that Government ought to do it. The Public Works Department if they have funds repair tanks where the people coatribute is of the cost, but it is difficult even to get them to do that much.

#### REMEDIES.

Nothing short of partial romission of the advance, say, 20 per ceat., will be of any use.

- 6. There is so little artificial irrigation in this district that its effect is inappreciable. I should say no. The people who live in the village cling so tensciously to their homes that they rarely go away even when the village is over-populated for the area under cultivation.
- B 7.—There are no cause of continuous flow in North Kanara.
- C 12 .- This form of irrigation is confined to the hilly tracks.
- (1) and (2). The dams are thrown acrose little mountain streums. A little trench is then dug which is led along the top of the field and the water is distributed on to the land from this by holes made in the banks.
- (3) The empty is generally maintained, I believe, for about 8 or 4 months. Laterice is invariably grown with this water and is generally planted in December. When the rainfall is low as in 1899 no lete rice is attempted to be grown. Actual drought is unknown.
- 13. (1) It is rurely that 2 crops are grown on the land. On the coast a second crop of vegetable is sometimes grown

in a patch, but not with irrigation and from streams but from holes sunk in the sand.

- (2) Rice and angarcane only are grown with irrigation.
- (3) Rice only heing grown, and as it will not grow without water, the field is not appreciably increased.
- 14. When the rainfall is unfavourable the villagers do not uttempt to grow any late crop rice. The monsoon is generally sufficient for the early crop.
  - 15. The irrigation is not supplemented by wells.
- 16. I cancot give any estimate and I doubt if thore is eny increuse.
  - 17. There is no rate paid for irrigation from streams.
- 18. The annual expenditare is trifling, not more, I should say, than Rs. 10 for each stream which will irrigate 30 acres. The actaal expense is nil, as the wood is applied free by the Forest Department and the only cost is the labour. This is generally borne by the tenant. He has no seemity and needs none.
  - 19. I cannot answer this question.
  - 20-22. Those perhaps do not upply to this district.

#### D.-TANKS.

- 28. These are found in the east of Haliyal, Sirei and Siddapur talnkas and the Mundgod Petha.
- (1) The tank is generally the head of a slight depression in the ground which is hundred up The extenment area is only a few acres.
- (2) The bund has a slaies from which the water is distributed over the uppermost levels; it flows down to the lower etretches from holes in the terraces.
- (3) (a) In a year of ample minfall the supply is maintained till the middle of April. Some of the larger tanks never dry up.
- (b) When the rainfall is scanty the tanks dry up in February.
  - (c) An actual drought has never occurred.
  - (4) The area irrigated will wary from 10 to 100 acres.
- 24. (1) The tanka that I have seen do not last long enough to grow a second crop. I have never seen a second crop. I have not seen the Mavinkop tank.
- (2) It increases the yield in a year of scanty rainfull only by admitting cultivotion of the higher lands. I have never seen them in a year of drought or of ample rainfall.
- 25. I do not know about the too late commencement of the rain, which generally commences pretty regularly. Early cessation of the rainfall means that only the low-lying terraces get onflicient water, as the tank is only an assistance to rainfall and much crop is grown above the reach of, the tank water.
- 26. No. When the tank race dry pits are dug in the bed of it, bat not for irrigational purposes.
- 27-29. I caunot answer these questions.
- 30. Nothing in the way of conservancy is due that I know of.
- 31. Private persons only construct little tanks to irrigate their own field or fields.
  - 32. I do not think there are many available sites.
- 33. The tanks frequently get choked with silt und weeds. In the hot weather when the tank dries up 'the people very occasionally usk district officere to remore it. "Repairing a tank" generally coasists of thie. If the Patel, which is rarely the case, is an infloential man, he persuades the villegers to do the work themselves.

#### E.-WELLS.

Wells are not used for irrigation except for the small palm and froit gardens in the compounds of houses. Heles are occasionally due in the beds of streams and water raised to the crop on the bank by means of a counterpoise. The average cost of construction is merely the labour involved, are of li wood, etc., is supplied free. They are not in general use except on the coast.

Note on the extension of Irrigation from the Malag tank, Dharwar Collectorate, Bombay Presidency.

The Madag tank is situated on the southern border of the Dharmar Collectorate of the Bombay Presidency and it in Mysere territory, the frontier passing over the centre of the tank dam.

#### Situation .- 75°27' East, 14°21' North.

- 2. The dam was constructed, it is believed, some three canturies ago, but, apparently, shortly after its conctruction the low enddle between two hills which was apparently need as a wiste-weir scoured out, rendering the dam, which is about 150 feet high and 1,300 feet bed width, practically needes.
- 3. The waters of this tank were not used till 1870-71. An ontiet through the dam and also the right and left bank canals were constructed during the years 1861 to 1867.
- 4. Mr. Joyner in 1886 submitted three alternative projects for raising the water level of the tank by 54 feet, 49 feet and a slightly increased level than at present, respectively.
- 5. The first two projects are at present out of the question, as they would involve the submergence of 12,000 acres in Mysore or occurry a whole talaka, the compensation to be paid for acquiring this site would amount to between Rs. 13,00,000 and 14,00,000 and the Mysore Government have refused to part with the land. The only possible extension is, therefore, on the lines of the smallest project and the following information is in apport of the advisability of a detailed survey being undertaken.
- 6. The discharges gauged in the river below the maste-weir from the year 1869 to 1893 chew that there is practically a continuous discharge of 100 ensecs available from June 20th till November 20th, in addition to the discharge drown off by the existing canals, which may be roughly taken at 15 casees, during the above period, though at times the canals are closed when there is no demand for water.
- 7. Table showing records of 25 years gauging of 100 cueses or over flowing to waste.

(Each month is divided into three periods of approximately ten days).

pictory tox			_		
	Mosth.			Period,	Namber of years to which 100 curees or over her been recorded during whole period tu 25 years.
June .	•	•	٠ {	1st 2nd 3rd	3 8 16
July .	.•	•	.{	let 2nd 3rd	20 28 25
August .	•	•	. {	lei 2ud 3rd	26 25 25
September	•	•	. {	1st 2nd 3rd	25 25 25
Ostober	•		. {	Ist 2nd 3rd	24 22 21
November	•	•	. {	1et 2nd 3rd	20-5; 19 14
December	•	• ,	.{	Ist 2nd 3rd	8 5·6 3·6

<sup>8.</sup> The period of cortain empty corresponds with the vice enlitivation season, and journ's is also grown during this period, but requires water aclote as the end of October, the supply in October being liable to curtailment in about three years out of 25.

- 9. The above is the case on the Dharma Canal situated near Hangal about 30 miles to the north-west, and this canal is situated in a wetter zone and cultivates nothing but rice, and a faw garden (fruit trees, coconnuts, etc.) lands. This canal is entirely successful, and is about 19 miles long excluding branches.
- 10. After the year 1893 till the present day the discharges have not been gauged, but records show that the waste weir has flowed continuously from 20th June till 31st December with only one break of ten days in November and in another year the whole of December.
- 11. The average discharges worked out from 1872-1884 are as follows :-

	Mon	th.	Атстадо спясон.	Maximum un one day.	
May June July August September October November December	:	•		20 270 2,028 1,338 801 666 353 70	Cuscon. 323 6,651 44,376 8,752 5,731 4,948 4,947 358

- 12. The above averages are only for a period of 12 years, but they show that on the average, 250 cusees may be relied on from 20th June till the end of November, and as rice does not require much water in the early steges of its growth in this district (no rice is transplanted), 250 casees may safely be rolled upon as available for irrigation without any storage whatever, during the rice and javari sesson.
- 13. The existing canals cultivate the lands near the village of Masur which has a fairly heavy rainfall. It is possible to take the water much further, however, to a far drier area and the attached tables and charts\* illustrate this.
- 14. The months of heavy rainfall at Meaur are June, July and October, whilst at Ranibeaur it he heavy falls may be expected only in October. Ranibeaur is worst off during August, when there is the createst amount of water movible for irrigation. There is, therefore, a better chance of water being utilized regularly near Ranibeaur than at Mosor. The area at present outlivated near Masur by irrigation is about 800 neres, but there is a distinct tendency to increase this area in years of scanty rainfall, such as 1891 and 1899, in which the areas are the lergest and the rainfall the least during the last ten years.
- during the last ten years.

  15. The rainfall at Birckerur is given to show the rapid falling-off in rainfall outside the Masur Volley.
- 16. Hirekerur is only 7 miles to the north-west of Masur. The reinfall returns for Masur, Hirekerur and Ramibenur all show that there may be a total failure of ruinfall during any month of the year. The meaths of June and July being least liable to failure. Any extension of irrigation would, therefore, be useful as protestion against famine.
- 17. The left bank canal may be onlarged to carry 200 cusces as a normal full supply discharge with a margin of 1 to 2 feet over this as possible maximum ierel and extended to near Ranibsonr. The bydraulic gradient may be made 7 82" per mile which is two inches in excess of that of the Dherma Canel which gives no trouble from weeds or silt.
- 18. A survey to locate the line oud for the preparation of the estimate is necessary.
- 19. The above proposals can all be carried out without any increase on the storage of the tank, but to allow for a possible shortage or break during the monsoon and to give nu increased head to the Regulater at the head of the canal, it is desirable to approach the Mysore Government with a view to their permitting a modified form of Regulation: as indicated by the bar dotted line on the strached sheet.\*

  No. 3 showing curves of water level in the Mudag Tank above weir-creat.
- 20. The weste-weir is already provided with piers and alits for planks, but the British Government have never been allowed to insert the planks.

- Mr. H. B. 21. The Regulation proposed cannot possibly da my Shoubridge. harm to the landa that would be solvenged, because they are liable to a submergene- up till 15th November of as unch as 5 feet and only 1' 6" is asked for on that date, after which only 8'.
  - 22. The shove proposals would provide water sofficient at normal full supply level to irrigate 10,000 acres with a duty of 50 acres per ensec, which is not a high duty where rain falls to nn appreciable extent, whilst the canal could carry, when the water level was 2 feet over F. S. L., enough for 15, 000 nores.
- 23. The right bank canal would be retained as a perennial canal as at present, and ofter the 15th November it and the 1st six miles of the left hank canal would be alone entitled to draw on the storage of tha tank as long as the waste-weir was not flowing. The area under command is about 45,000 acres.
- 24. The proposal is wall worth the serious consideration of Government, and there is no reason why it should not sacceed us well as, if not better than, the Dhermin Canal which it is shortly proposed to remodel to irrigate 12,000

#### Table of rainfall from 1868 to 1901.

					Masue.			Blenzere.			Rangernus.		
					Maximum.	Average.	Minimum.	Maximum.	Average.	Malmum.	Maximum	Average,	Minimam
May . June .	•	:	•		10·3 10·1	2·88 4·58		7·9 8 8	2 26 3·81		7·5 5·8	2·75 2·88	
July August	•	÷	•	:	18·8 7·6	6·42 3·41	·6	16·9 10·3	5 89 3·14	11	6·9 6·7	3·24 2·39	.8
Septomber October	i		•	:	99 107	3 30 5·17	2	7-7 12:3	2 63 4 85	4	10 6 14:7	3·21 5·26	i
November December		:	:	•	5·6 2·3	1.75	***	7·8	1.32		12·5 3·3	1.53	

(11) Minutes of a Conference held with the Hon'ble Mr. J. Monteath, C.S.I., I.C.S., Member of Council, Bomboy, Poona, 30th December 1901.

#### PROVINCIALIZATION OF TREIGATION WORKS.

J. Monteath. teath, if you would give us the beneat of your opinian on the question of provincializing the Irrigation Works of this Presidency.

Mr. Monteath.—At present the only Provincial Work is the Gokak Canal which was made in connection with n mill contract with a private company. The Secretary of State ordered it to be so classed. Generally the object of provinalalizing is to provide a check on expenditure, but it does not exist in this cose, as everyhody wants to extend irrigation. I see no objection to provincializing irrigation works, nor do I see much advantage. The receipts from these works in the Presidency proper are small and are chally recovered as land revenue; the direct receipts are very small; the accounts are complicated, and provincializing small; the accounts are complicated, and provincilizing the works would save correspondence in this respect, and applications for sanction, etc. As to increasing the interest which the Local Government toke in the works, I do not think that is passible.

Mr. Higham.—Might you not found the receipts from the minor works so as to provide means for their improvement f

Mr. Monteath.—Not very well in Bombay; there are no no direct recepts from minor works. The water revenue is consolidated in the land revenue.

Sir Colin Moncrieff - Under the present arrangement he water rate is Imperial and the land rovenue Provincial. Might not the Province be given the whole of the water share of the laud revenue so as to increase its interest in the

Mr. Monicath.—If we get the water share—say four-fifths of the land revenue—it would perlups result in the tanks being maintained in a more efficient state, but I doubt if there would be any increase in laterest; our officers could not be more keen in the motter than they are nt present.

#### MAINTENANCE OF TANES AND SMALL ISBIGATION WOLKS.

Mr. Higham .- If the Govarnment of India were to give the money required for making small works, could the local Government undertake their maintenance if it got credit for all the increased lend revenue? At present it only gete one-fourth as its share.

Mr. Montcath .- I think the water share of the revenue would suffice to maintain the works. There is no difficulty as regards mointaining these small works; some are not worth maintaining and might he hunded over to the people to keep up or not as they choose.

Mr. Higham .- Would you first put them into an efficient state of repair ?

Mr. Monteath .- Not those which are not worth repairing; I would leave that to the people and generally reduce the assessment on land under them to dry rates, but in some onsess where the warks are to utilize at no great cost n natural advantage of water, I would make some charge for the water. No charge should ordinarily be made in the case of small tanks made by private individuals.

Mr. Higham.—You say that there is no difficulty as regards mointaining the works, but in the case of the selected works which are to be maintained by Government, the Local Government will got only one-fourth of the land revenue, and if it spends money on repairing the works, its interest in the returns an the expenditure will be noly one-fourth of the whole.

Mr. Monteath.—I meant that there would be no difficulty if we got the water share of the assessment, and I was speaking merely of the cost of maintonance. The Government of India would have to give the money required to put the works into a proper state in the first instance.

Mr. Ibbetson.-You said just naw, Mr. Monteath, that no sharge would be made for the water of small tanks made by private individuals. Is not a royally charged? I generally agree that the water in the property of Govern-ment and that a charge in feir; but is it, do you think, judicious to impose a charge in places like the Deceau, where it is desirable that all possible means should be taken to execute a individual. to encourage irrigation?

Mr. Monteath .- Much depends on circumstances ; there are cases in which the water advantage is exceedingly small and obtained at the cost of the cultivator, e.g., surface draining canglit by bands; in such axes I would not obarge. But I would not relinquish the charge nitogether; would, for instance, charge the people living on the hank of a running stream.

Mr. Ibbelson .- Even if the abolition of the charge would atimulate the use of the water?

Mr. Monteath .- It would hardly do that -- the chergo is Mr. Montath.—It would hardly do that.—the chergo is small as compared with the adventage. In many cases on running streams where the water advantage is considerable it is reasonable to make people pay; it would not be equitable to let them have for nothing so great on advantage over their neighbours; at the same time I would be exceedingly lenient and do everything possible to stimulate the use of the water.

Sir Colin Moncrioff.—What is your opinion, Mr. Moncoath, regarding the 10 per cent. contribution which the cultivators must agree to before their tank is repaired? I see that the Public Works Officers refer to the difficulty arising from this rule of repairing the tanks in groups.

Mr. Monicath .- Some officers have advised that it should not. ba abandance, as the offer of a coatribution is evidence

that there is a real desire for the water, but if a full assessment is charged oo account of the tank, it seems hardly right to aharge more. On the whole, I think that the rule . daes mere horm than good, and I would obelish it.

Mr. Ibbetson.—De you think that it would be possible to make the rayots carry ant tha petty repairs themselves?

Mr. Monteath .- I do not see how this could be enfarced; it would be difficult to fix the responsibility.

Mr. Ibbetson.—If the necessary powers were given to him by legislation, could not the Mamlatder orrange? This is done to a very large extent in the Punjab, where o man pays dauble the market value of the labour if he fails to carry out his share of the repairs.

Mr. Muir-Mackenzie.—On our Bundharas the people da carry out the repairs; each man has his allatted work; but much dapends on the individuality of the Civil Officer in getting the repoirs fally carried aut.

Mr. Monteath .- There would perhaps be no difficulty in proportioning each man's work according to his area—tho difficulty would be in enforcing the execution of his share of the work, which he woold probably contend was not a fair share owing to greater or less distance of his land from the tank, and such reasons.

#### SEPARATE ESTABLISHMENT FOR IRRIGATION WORKS.

Sir Colin Monerieff.—Whot is yaur opinion on the question of forming n separate Irrigation Department. During our tour in the Bombay Presidency we have been much struck by the fact that the superior officers of the Public Works Department have so much work of other kinds to nitend to that they have not sufficient time to attend to matters of irrigation.

Mr. Monteath.—If there were money enough to spend on works, no doubt it would be desirable talhave a separate branch for irrigation works.

Mr. Migham -- Every Province in which there is irrigation on any considerable scale has a separate Engineer and Secretary for irrigation.

Mr. Montenth .- The last three Public Works Secretaries in Bombay have come from Sind, where they gained special experience in irrigation.

#### PROTECTION AFFORDED BY ISBIDATION WORKS.

Sir Colin Monerieff.—Can you give us any idea of the extent of the protection offered by Irrigation works during the famine ?.

Mr. Monteath.—I hove seen great good dooe in famine time even by such irrigation as we have. In the arrly part of 1900 near Ponno where there was canal irrigation one can the difference; the villages with irrigation were well off; but that was where irrigation was available in the famine time. I think also that much can be said in favour of small tanks. Peaple say they foll when they are most wanted, but in a year of drought there is often early rain which is sufficient to fill them and carry craps to maturity.

Sir Colin Moncrieft .- We have naticed a very striking rise in the famine year in the orce irrigated.

Mr. Ibbetson.- Especially in Ahmednagar.

Mr. Monteath .- In Gujarot also there was a considereble risa.

Mr. Ibbetson.-Yes, owing to the construction of kachekn wells.

Sir Colin Monerieff.—Can you give us any idea of the protective value of irrigation works which fail is a very dry year?

Mr. Monteath .- I bave no information.

Mr. Muir-Mackenzie.-Wo chall get that in Shola-

Mr. Monteath.-Also in Dharwar.

Mr. Ibbetson.—That is chiefly in the ghat portion of the district?

Afr. 1 district.

Mr. Monteath.—The tanks are scattered over the whale district.

Sir Colin Moneyief.—Our enquiries tend to show the wast importance of constructing storage tanks in tracts of assured rainfall.

Mr. Monteath.—Yes, I hope that more canals like the Nim may be possible.

Mr. Higham .- The Mahladevi tank promises well and will, I hope, 'Irrigate'a larga area.

Mr. Montouth.—It should afford good protection if the 'available water is distributed over a wide area.

Air. Higham.—Take a village of 500 people with the usual orea of dry cultivation; if we irrigated 100 acres would it save the people from the necessity far famine

Mr. Monteath.—I think it would have that effect. I noticed in the famine that in villages in which there was a considerable irrigated area, not only those who held that area, but the whole population, seemed to be better off than in other villages.

Mr. Higham.-Woald you ever get the whale villege on famine relief?

Mr. Monteath.—Yes, if the works are close, sometimes virtually the whola population comes on a wark.

Mr. Higham .- What woold be the average number on

Mr. Monteath.—Thirty per cent. as an axtreme figure. The 100 cores of irrigation would not only probably keep 150 people of relief, but with that omount of irrigation I think that no one in the village would have to go on relief, if the water were well distributed.

Mr. Muir-Mackenzie,-Mr. Visvesvaraya says that on the Nira caoal deriog the famine time the people then selves arranged that each holder should have n small patch under irrigation.

Sir Colin Moncrieff.—I suppose it would be difficult to estimate the maximum area to which the benefits af irrigation could be extended. Some af our witnesses have stated that not more than 10 per cent. of the culturable area could be protected by wells.

Mr. Montenth.—It would be difficult to say; the proportion that could be protected varies greatly in different districts. In the Eastern Deccon probably not more than one-tonth could be protected by wells and tanks dependent on scanty rainfall. In Gujarat probably semowhat more than one-tenth could be protected by wells; in the Western Decan districts, large tanks constructed in the Ghât range might greatly raise the proportions.

#### TAKAVI LOANS.

Sir Colin Moncrieff.—We have heard very various opinious expressed an the question of taken grants, and as to the probable effects of lowering the rate of interest, or of charging interest and not recovering the principal, or of giving a grant and recovering by increasing the assistment.

Alr. Monteath.—I think that in any case the demands for takavi will now be heavy and as high as we con meet. The rate of interest has had no effect in discouraging applications.

Sir Colin Moncrieff.—If Government were to forego interest for, say, five years?

Mr. Monteath .- I doubt if it would have much effect.

Sir Celin Monericff .- As regards delays in obtaining takavi?

Mr. Monteath .- I think that some anquiries are necesrary before granting an odvance; for instance, in and case after an advance had been given it was found that tha land did not belong to the borrower; mather man claimed the lend and were his asse, and na recovery from the land was possible.

Mr. Ilbetson.-Under the law is not the land responsible for the loon?

Mr. Monteath .- I do not think so; the low officers have held that where there is a decree hanging over the land when the loan is given, the Government demand does not take procedures of the unexecuted decrea.

Mr. Ibbetson.—If money is speat on a well and improves the land and the secority, would it not be foir to legislate and make the advance a first charge an the land?

Mr. Montcath .- Yes, I think it would be reasonable to make the advance the first charge whore the money is really apont on the land.

Mr. Muir-Mackenzic.—The Records of Rights, on which we are beginning to work, will assist us a great deal.

Mr. Receiver.—Our whole experience in India goes to show that the amount of takers which we fail to recover is very small. I think we might venture more where the risk is so small.

Mr.J. Monteath. Mr. Monteath. Mr. Monteath.—Yes; in this Presidency also the people generally make no difficulty about repaying taken; but the naventages ore now very widely uppreciated and we can easily attlize as much as can be made available.

easily ntilize as much as can be made available.

Mr. Ribelson.—The difficulty is to ensure that the money is really spent on the well. One suggested cure is that the money should be given in small instalments; this is bed in some ways; it leads to some delay, and there is more risk of some of the money not reaching the horrower; but it is effective, as a second instalment would not be given until the first had here properly spent.

Sir Colin Moncrieff.—The law allows 20 years for the recovery of takaoi, hat the district officers allow much less; why ere they harder than the law?

Mr. Monteath.-I do not know.

Mr. Ibbeteon.—It is just the same in the Punjab; the idea is to save the borrower from heavy interest charges.

Sir Colin Monorieff.—It has been suggested to take payment of interest only and not to recover the dobt.

Mr. Monteath.—I would not go so fur; it would become a bereditary debt.

Mr. Ibbetson.-Yes, and the well might fall in.

Mr. Muir-Mackenzie.—We might take the risk; our stone wells last for ever with very little repair.

Mr. Monteath.—I think that liberality should be exercised in susponding repayment in hod years, but I would not go further.

#### KATHIAWAR.

Sir Colin Monerieff.—Have you had any experience in Kathiawar?

Mr. Montoath.—I visited it in the famine, but have not served there.

Sir Colin Mancrieff.—Do you consider that political difficulties, arising from the latermingling of the States, are likely to give trouble in connection with irrigation works?

Mr. Monteath.—I suppose there will be difficulties, but I think they might be avercome.

Sir Colin Moncrieff.—Then there is another difficulty as regards the owners of laad in the heds of tanks. No compensation by measy payment will satisfy them; they must have land in exchange and there is no lend available.

Mr. Ibbetson.—It is losing the proporty in the land that they object to; could not that he left with thom ?

Ms. Monteath.—What they are most joalous about parting with is their jarisdiction.

#### FAMINE WORKS

Sir Colin Monorieff.—Whot, in your opinion, is the best form of employment for famine labour?

Mr. Monteath.—Large tanks; where the work is concentrated, discipline and supervision are easy. Village works, which, according to the last Famine Commission, should be the backhone of relief, are, in my opinion, impossible in this Presidency on a very large scale. No arrangements can be made for expervising a very large number of such small works as the repairs of village tanks. There is no village organization, and no one in the village who can be trusted to supervise the work; there are no panchayete except for settling caste disputes and no coperation except for very epocial purposes. For the want of mything better a great deal has been done in breaking road metal by famine relief leboar; but here the question of the subsequent maintenance of the road arises; a metalled road is the worst road of all nuless it is kept in repair. I don't, however, agree that here here all value of the of common of employment; it has a great advantage in simplicity as regards individual poyments.

Sir Colin Moncrieff.—Would you complete now, by ordinary labour, such works as the Visopar tank which we saw the other day?

Mr. Monteath.—When work is so neor completion us to pay interest on the cost of completion and the maintenance charges I would finish it; but if much remained to be done, I would leave it till the next famine.

Sir Colin Monerieff.—I fear that the puddle in the treach would deteriorate and become useless if left dry for a number of years.

Mr. Higham.-Yes, I think there might be that danger.

Mr. Monteath.—One objection to large tanks for famice labour is that the people cannot be sent a long way; so that unless projects for large tanks can be found scattered throughout the district some other form of work becomes necessary. In Broach we could not induce the people to go from the Broach tank to more useful work. In some cases also volnable land is taken up, worth more than the irrigation will bring in—the Broach tank for iostance.

Sir Colin Monerieff.—Speaking generally, what do you consider will be the best classes of work for protecting the precarious tracts?

Mr. Monteath.—Works for extending irrigation; now that eaongh railways have been mode to prevent obsolute want of food in any part of the Presidency, but an establishment is necessary to prepare and examine projects. We have often had to emplay famine-stricken people on tanks which were reported to be very promising, but after a great deal of money was expended, detailed examinations showed that they could be completed only at ecormous cost and would he of comporatively little protective works and even would not hold water for any length of time.

(12) Questions for Revenue Officers including Officers of the Public Works Department who have had experience of the administration of water-supply.

N. B.-Officers are requested to answer those questions only regarding which they can give information from personal knowledge, or from anthenlie source.

#### A.-GENERAL

- 1. To what district or tract do the answers below rofar?
  What opportunities have you enjoyed of becoming acquaintad with it?
- 2. Whet is the nverage rainfall in each month of the year?
- 3. Is there any obstacle to the extension of irrigation arising from-
  - (1) spareity of population ?
  - (2) insufficient supply of cattle suited to the cultivation of irrigated land?
  - (8) insufficient supply of manure?
  - (4) unsuitability of soil (e.g., block cotton soil) to irrigation?
  - (5) uncertainty of the supply of water or its too late commencement or too early cessation?
  - (6) lack of copital for the initial exponditure or of funds for the more expensive cultivation of irrigated crops?
  - (7) fear of enhanced rent or revenue assessment?
  - (8) uncertainty of tenure or defects of the Tenancy Law P
  - (9) other reasons?

- 4. For what period, if any, is land which is irrigated from works constructed by private capital exempted from enhancement of assessment on account of the irrigation? How is the exemption secured in practice? Is any similar exemption from enhancement of rent extended to tenants who have extended irrigation to their holdings at their own cost? Do you consider that the existing provisions in this respect are sufficiently liberal? If not, what alterations would you suggest?

  S Are been ander the Land Landauer of the landaue
- 5. Are loane nader the Land Improvement Act freely taken by the people for the extension of irrigation? If not, why not, and what measures would you enggest for the encouragement of these loans? Would you recommend—
  - (1) reduction of the rate of interest?
  - (2) remission of the laterest?
  - (3) partial remission of the advance P
  - (4) total remission in cose of failure of the attempt to obtain water?
  - (5) extension of the period of repayment?
  - (5) extension of the (6) grants-in-aid?

6. Does the extension of irrigation tend to injure the remaining oultivation by attracting its oultivators to the irrigated tracts?

can you give any instance of this which has come to your knowledge? Is there eav strong desire evinced among the recolo of your district to have means of irrigation extended to it or increased?

- B .- CANALS OF CONTINUOUS FLOW.
- 7. To what extent does the irrigation increase the value of the produce of land-
  - (I) by rendering it possible to cultivate two harvests instead of one ?
  - (2) by leading to the substitution of more for less valuable crops or varieties?
  - (9) by increasing the yield-
    - .. (a) in year of ample rainfall?
      - (b) in a year of scanty minfall?
      - (c) in a year of drought ?
- 8. Can you give an approximate estimata of the increase in the total numual value of the produce per acre due to the irrigation-
  - (1) on the average of a normal torm of years?
  - (2) in a year of drought ?
- 9. What is approximately the average annual rate per acre paid on account of irrigation -
  - (1) by the cultivator (or the owner?) of the land to the owner of the caeal in the form of water-rate or otherwise?
  - (2) by the caltivator to the owner of the land in the form of enhancement of reat or otherwise ?
  - (3) by the owner of the land to the Government in the form of enhancement of revenue, water advantage rate, owner's rata or atherwise ?

In each case please state whether the rate is paid on the area natually irrigated during the year, on the area ardinarily irrigated, on the whole irrigable area, on the total area of the helding, or how.

- · 10. What, if any, private expenditure is necessary to bring the water twithe field or to prepare the land for irrigation? Is this generally incurred by the landlord or by the tenant? If by the latter, what security has he for recompmont P
- 11. Has noy damage resulted to the people or deteriora-tion to the sail from irrigation without manure, from too profuse, too extensive, or too frequent irrigation, from water-logging, sait efforcessence or otherwise? If so, what water-togging, rate emorescence or otherwise? It so, what is its form, its extent and, in your opinion, its cause and the possible remedy? Of what standing respectively are the arrigation in gar-tion and the evil which has sprung from it? Is the letter increasing? What is your experience of the results of draining irrigated land?

#### C .- CARALS OF INTERMITTENT FLOW.

- N. B.: Small terigall in channels, supplied by temporary dawn thrown server hed, are included under this beading.
- 1 12. Please describe generally-
  - (1) the manner in which the (or group of causts) in the district is supplied with water;
  - (2) the manner in which the water is distributed to the land :
  - (3) the period for which the supply is ordinarily majotalned-
    - , (a) in a year of ample rainfall;
    - (b) in a year of scanty ruinfall;
    - (c) in a year of drought.
- 13. To what extent does the irrigation increase the value of the produce of land-
  - (1) by rendering it possible to cultivate two harvests instead of one?
  - (2) by leading to the substitution of more for less rainable crops or varieties ?
  - (3) by increasing the yield-
    - (a) in a year of ample rainfall ?
    - (b) in a year of scauty rainfall ?
    - (c) in present drought?
- 14. How for is the value of the irrigation diminished by-
  - (1) the too la'e commencement?
- : (2) the too early ossiation of the supply ?
- 15. Is the irrigation ordinarily supplemented by irriga-tion from wells given to the same land and, if so, how far is this associal?
- 18. Can you give an approximate estimate of the increase in the total manual value of the produce per acre due to the irrigation-

- (1) on the average of a normal torm of years?
- (2) in a year of drought?
- 17. What is approximately the average annual rate per nore paid on account of irrigation-
  - (1) by the cultivetor (or the owner?) of the land to the owner of the causl in the form of water-rate or . otharwise ?
  - (2) by the cultivator to the owner of the land in the form of enhancement of rent or otherwise
  - (3) by the owner of the land to the Government in the form of enhancement of revenue, water advintage rate, owner's rate or otherwise ?
  - (4) hy the ewners of the canal to the Government in the form of royalty ?

In each case please state whether the rate is paid on the area actually irrigated during the year, on the area ordinarily irrigated, on the whole irrigablesures, an the total area of the helding, or how.

18. What, if any, private expenditure is necessary to bring the water to the field or to prepare the land for irrigation? Is this generally incurred by the landloid or by the tenant? If by the latter, what security has he for recoupment?

19. Has any damage resulted to the people or deteriora-tion to the soil from irrigation without manner, from ton profuse, too extensive or ton frequent irrigation, from waterform, its extent and, in your opinion, its eause and the possible remedy? Of what standing respectively are the irrigation in question and the evil which has spring from it? Is the latter increasing? What is your experience of the results of draining irrigated land?

20. How is the maintenance (repairs, silt clearance and the like) provided for, and what is the approximate annual cost per acre irrigated? Does the system work fairly well and is noy legislation required?

- 21. Were any of the canals constructed by private persons? Has any trouble arisen in such cases in regard of the supply of nater by the owners of the canal to other owners of land, or of the realisation of dues for the same? Has it been found accessary for Government to take ever the management of any private canals, and If so, why?
- 22. Do you consider it advisable to onconrago and assist the construction by private persons of further canals, and, if se, how could this best be done?

#### D.-TANKS.

- 23. Please describe generally-
  - (1) the way in which the tanks in the are supplied with water ;
  - (2) the manner in which the water is distributed to or utilised upon the land;
  - (3) the period for which the supply is ordinarily maintained -

    - (a) lu a year of supple rainfall; (b) in a year of scauty rainfall;
    - (c) in a year of drought.
  - (4) the area ordinarily irrigated from a tank.
- 21. To what extent does the irrigation increese the value of the produce of land-
  - (1) by rendering it possible to cultivate two harvests instead of one?
  - (2) by loading to the salstitution of more for less valuable crops or varieties?
  - (3) by increasing the yield-
    - (a) in a year of stuple rainfall?
      (b) in a year of scanty rainfall?

    - (c) in a year of drought ?
- 25. How far is the value of the irrigation diminished by
  - (1) the top late commoncement?
  - (2) the tao early cossation of the supply ?
- 26. Is the irrigation ordinarily supplemented by irrigation from wells given to the same land and, if so, haw far is this essential?
- 27. Can you give an approximate estimate of the increase in the total annual value of the produce per acre due to the irrigation -
  - (1) on the average of a normal term of years?

- (2) in a year of draught?
- 28. What is approximately the average annual rate per acre paid an account of irrigation—
  - (1) by the cultivator (or the owner?) af the land to the owner of the canal in the form of waterrate or athorwise?
  - (2) by the cultivoter to the awner of the land in the form of enhancement of rent ar otherwise?
  - 3 by the awner of the land to the Government in the form af enhancement of revence, water advantage rate, awner a rote ar atherwise?

In each case please state whether the rate is paid on the area actually irrigated during the year, on the area ordinarily irrigated, on the whole irrigable area, on the total area af the halding, ar how.

- 29. What, if any, private expenditure is necessary to bring the water to the field or to prepare the lond for irrigation? Is this generally incurred by the landlord or by the tenant? If by the latter, what security has he for recoupment?
- 30. Haw is the maintenance (watching, repairs, silt olearance and the like) provided for? What is the approximate annual cost per nora irrigated? Does the system work fairly well and is ony legislation required?
- 31. In the case of tanks constructed by a private person ar persons how is the distribution of water to the other awners of land regulated or arranged for? Has my tranble erisen in this respect or in connection with the realisation of water dues? If so, is Government assistance advisable and is any legislation required?
- 32. Da yan cansider it advisable to encourage and assist the coestruction by private persone of further tanks; and if so, how could this best be done?
- 33. Io much inconvenience experienced from the liebility of tanks ta eilt up? Cun you give any statistics as regards the doth of silt accumulation per annum? Is it the custam to remove the silt by dredging or otherwise? If not, what steps are taken to prevent the ultimate silting up of the Whole tank?

E.-WELLS.

- 34. Please stote generally for each of the main tracts into which the district is divided.-
  - (1) the overage depth of permanent wells;
  - (2) the nature of the supply, whether from springs or from percolation, and whether liable to feil or become too saline to use-
    - (a) in an ordinery year;(b) in a year of drought;
  - (3) the average cost of construction;

- (4) the average duration of a well:
- (5) the manner in which the water is usually mised :
- (6) the average area attached to ond commouded by a
- (7) the average area irrigated in any ane year.
- 35. To what extent does the irrigation increase the value af the produce af land
  - (1) by rendering it possible to cultivate two harvests instead of one?
  - (2) by leading to the substitution of more for less valueble craps ar varieties?
  - .(3) by increasing the yield-
    - (a) in a year of ample rainfall P
    - (b) in a year of ecanty rainfall ?
    - (c) in a year of draught?
- 36. Can you give an approximate estimate af the increase in the total anumal value of the praduce per acre due to the irrigation-
  - on the average of a narmal term of years?
     in a year of drought?

- 37. Whot is approximately the average annual rate per nere peid on account of the irrigation-
  - (1) by the cultivator to the awner in the chape of
  - enhancement of rent?
    (2) by the awner to Government in the chape of enhancement of revenue?

Are these rates paid on the tatel area attached to and commanded by the well or an the area actually irrigated during the year, or how?

- 39. Are serious difficulties often encountered-
  - (1) in the selection of a spot in which a supply of water will be obtained?
  - (2) in the actual construction of the well?

Hes assistence over been aftered by Gaverament or by local badice in the shape of oxpert advice, trial borings, the use af hering tools, or otherwise? If so, how far has assistance been made use af and found successful? If not, do you think it would be useful and how could it best lo given?

- 39. Are you in favour of the construction by Government of wells in land which is private property? If so, how would you work the scheme? If not, what objections do you perceive P
- 40. Are temporary wells commonly used in the—district? How far no they a protection against drought? How would you propose to oncoarage their construction in a year of scenty rainfall?
- (13) Memorandum of points to be considered by the Irrigation Cammission in Sind.
- 1. Average area irrigated by each group or system of canals as compared with the onliveble area commanded.
- 2. Proportion of flow to lift irrigation.
- 3. Grawth of irrigated area during last 20 years, separately far onch year for Right und Left Bank Canals but not for each system.
- 4. Variations in total area es compared with variations in Bukkor gauge, or fluctuations in river supply.
- 5. Areas that might be brought under irrigation by proposed extensions af axisting canals or according to
- 6. Relation of the total irrigated area to total cultivable
- 7. Area depending on well cultivation massisted by
- 8. Canale which are ordinarily able to obtain a perennial ar cold weather supply.

- 9. Extont to which the supplies to the canals have been affected if at all by the withdrawals for new canals in tha
- 10. Has the necessity far a weir at Bhakkar, as proposed by Sir E. James, been felt?
- 11. What canals would be benefited by the construction of such a weir, and to what extent?
- 12. Hove any investigations been made to show the practicability of such a weir?
- 13. Da the results so far uttained on Jamraa Canal indicate that it will be as successful and that it will irrigate ns large an area as anticipated in the revised estimate?
- 14. Areas, if any, irrigated from private canals, which are not under cootral of Irrigation Dopartment or referred to in the Administration Report.
- 15. Generally, what ecopo is there for extensions of irrigation in Sind including Kolat arother fareign torritary and in what order should they be considered?
- (14). Momorandum of points to be considered by the Irrigation Commission in the Bombay Presidency.
- 1. The gross and culturable areas in each district and the Culturable and irrigable proportions of the latter which ore protected by Government irrigation works, by private ar village works and by wells respectively. Character of the soil.

Extent to which cultivation is dependent an artificial irriga-tian. Rainfall. Is there ordinarily a demond for water in Gnjarat during south-west monsoon? What are the crops which require irrigotion and haw many waterings do they require, and at what times of the year? How is the distribution controlled, and in what form is irrigation revenno realised?

- 2. Experience as rogards black soil. Do small tanks.

  Black cotton soil.

  Constructed in such soil held water, and can high earthen dams be made of it without masonry cors walls? When the land irrigated is a black soil, is there any domand for water during seasons of average rainfall or only in case of prolonged dronght? In such soils does the irrigated area show a falling off in years of fair or good rainfall owing to slack domand and is the revenue more precarious on this account than on tanks commanding other classes of soil? Has there been a desire for irrigation works on the part of sowners of black soil, and is the construction of tanks for such soil considered as remunerative or as important as for other classes of soil?
- S. Description of existing Government irrigation works.

  Government irrigation Total annual irrigating capacity, and range of variation Ato these works to be depended on in a proposed works as in the memorandum by Inspector Goneral of Irrigation, dated 7th May Question of utilising the waters of the Narbuda, Tapti and Salarmati for irrigation of Gujarat districts. Any other possible sources of irrigation.
- 4. Number and capacities of the Provincial irrication works. Expenditure on new works and on maintrunnes during last ten years. New Provincial works, if any, sanctioned or proposed. Extent to which provincial revenoes laws been applied to the construction of new irrigation works and the limitations to such application. Hoes the Province get the whole of the increase of foreme due to the construction of such works? Have present arrangaments under the Provincial settlement the effect of encouraging or discouraging the application of Provincial revenues to works of irrigation? Is it do-irable that Provincial revenues abould in future by doyoled to the construction of such works, or should all new works be constructed from the provincial Finds? In what cases should now irrigation works be undertaked as a charge against Provincial Finds?

5. By whom constructed and controlled. Number of plathet or village works. Such works and aggregate extent of cultivation dependent on them. Responsibilities of Government in connection with their maintenance as fixed at former earliements. Average annual orporaliture, if any, incurred by Government on these works excluding expenditure on relief works during late famines. Is any irrigation realized or are temissions of land revenus given when the works fail? Have new works of this class been constructed of late years otherwise than as famine relief works? At such works and artaken by histrict flouds or by private land-owners? Is it desirable that District Funds should be expended on such works? Has it been the practice for Government to encourage the construction of such works by loans to District Boards or to land-owners? Can the protective value of these works be increased by devoting more money and greater attention to their up-keep, and by encouraging the construction of new works? Enforcement of local responsibilities in this connection. Value of such works as conversing village water-supplies for mon and cattle, without reference to irrigation.

6. Total area irrigated by wells in ordinary years and in wells.

Wells.

Wells.

Wells.

Wells.

Wells.

Wells.

Wells onstructed mountly during last ten years. Extent to which construction has been assisted by advances from Government. Concessions, if any, given to the constructors of new wells. Is it possible or desirable to stimulate the construction of new wells by more liberal advances or inducements? Extent to which wells have been affected by the droughts of 1820-1901. Were any of those which ran dry deopened, and if so, with what results? Namber failed or abandoned. Average depth of water below surface and cost of wells used for irrigation, and item served by each. Reports by Mr. Orling and Geological Officers on possibility of artosiau wells in Gajerat.

7. District or tracts in which lands or crops are injured by water-legging or excess of water in very not gener. Are additional drainage works required, oithor on sanitary or agricultural grounds P Source from which funds would be provided for such works. Would they result in any increase of revenue, or in preventing less of revenue now remitted after seasons of flood ?

8. Classification of the works on which relief labour was supplyed in the districts affected and amount expended on each class, say Roads and Road-metalling.

Railway work, including collection of ballast—Irrigation works—Villago tanks and other water storags works—Miccellancous—.

Works incompleted at and of famino which it is considered desirable to complete as a charge against Provincial on Imperial revenues. Reasons for proposing their early completion and results anticipated. Results attained on completed irrigation or storage works, especially village tanks. Have they been found to hold water and to improve or conserve the resources of the village for watering cattle, etc. ?

9. Districts for which programmes have and have not programmes of relief been prepared. Examination of programmes, especially for districts most liable to famine, with reference to the number of units provided tor, the distribution of the works over the district and their utility. Arrangements for maintaining, extending or completing the pregrammes.

10. General enquiries will be made in regard to irrigation works in Kathiawar, with reference more particularly to the works carried out during the late famine as in paragraph 8.

11. Enquiries will be made as in Gujarat as in presgraphs

Statistics for typical 1 to 8. In addition statistical information will be required regarding all the larger or typical irrigation works in the Decoan as below :—

I.—Initial statistics—
Area and nature of catchment.
Assumed average annual rainfall.
Full supply capacity of tank in m. c. feet.
Percentage of capacity on assumed average rainfall.
Water spread at fail supply.
Maximum height and total length of dam.
Cost of dam, waste weir, sluices.
Compensation for land submerged by tank.
Cost of canal and distributing olumnels.
Total capital cost.

II.—Annual statistics for each year since completion—
Rainfall of the year.
Amount stored during year.
Amount run over waste weir.
Total run off for the year.
Percentage of tun off on rainfall of the year.
Area trrigated during the year in acres.
Quantity of water, if any, left in tank at end of irrigating season and available for next year.

Initial statistics of the same kind should be given for all new projects which have been sufficiently investigated, the proposals for which will be considered by the Committee.

12. Scals of water rates an major and minor works. Are implications for water received annually, and how is distribution controlled? Effect of years of favourable rainfall on the demand for irrigation revenue. Are tanks always empty at end of irrigating season, or do any carry supplies on to following year? Do the irrigation works get a fair credit for the increase of revenue due to their construction, or is this increase limited to the amount realized as water rate. Are the obarges for unintenance and establishment fair or exaggerated by reason of the same establishment being employed also on civil works? Generally may the revenue accounts of these works be accepted as correctly indicating the financial results attained on them?

Value of works in reducins during the famine of 1897 and subsequently. Areas irrigated. Was fumine relief necessary either relief extended in the original properties of famine relief works or of grataitous relief extended in the villages protected by these works, of can any estimate be formed of the extended in the of the cost of famine relief would have been increased if these works had not been in operation?

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80575 INDIAN IRRIGATION COMMISSION, 1901-

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# BENGAL. INDIAN IRRIGATION COMMISSION. MINUTES OF EVIDENCE.

# THE IRRIGATION COMMISSION OF 1901-02.

#### BENGAL.

COLONEL SIR COLIN SCOTT-MONCRIEFF, K.C.M.G., C.S.I. (Picsident).

Mr. J. W. P. Muir-Mackenzie, I.C.S. Sir Thomas Highau, K.C.I.E.

Dewan Bahadur P. Rasaratna Mudalian, C.I.E. Mr C. G. II. Allen, I.C.S. (Temporary Member for Bengal).

Mr. W. B. Gondon (Secretary),

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#### FIRST DAY.

#### Bankipore, 24th October 1902.

WITNESS No. 1 .- Mg. J. G. Couring, Collector, Paina.

- 1. Q. (The President.)—You are Collector of Patna, I understand?—Yes.
  - 2. Q. How long have you been here !- 1} years.
- 3. Q. Where were you before that P-I have been in Bhagalpere and Eastern Beagal; in the early part of my service I was in North Bihar.
- 4. Q. Have you ever had anything to do with the famine question P-No, except for a very short time in the Midnapore District.
- 5. Q. You say in your memorandum in reply to ques-tion No. 3 with regard to the character of the soil in Dibar "heavy soil on the whole; much of it cotton soil suited to the river system of irrigation." What is this exactly; is it black cotton soil, as it is elsewhere in India?—It is locally known as cotton soil; it is very friable, boggy in the rains and oracks in the dry wenther.
- ö. Q. Is it black?-Some of it is black; a portion of it is light in colour.
- 7. Q. You say "it is sulted to the river system of irrigation." What do you mean by that system ?—I mean the system of irrigation in the Bibar Sub-division where water is collected in these reservoirs.
- 8. Q. I presume it is called cotton soil, because it is suitable for the growth of the crop?—I am not aware of that. It is simply a local name.
- 9. Q. Does it take irrigation ?- I do not know enough about that to say.
- 10. Q. (Mr. Muir-Maokenzie.)-I understand that this soil that you call cotton soil is, as a matter of fact, irrigated, is it not? - Yes, it is irrigated.
- 11. Q. Whother it is the same as in other parts of India and proves refractory to irrugation you are unable to say? -Yes.
- 12. Q. (The President.)—In answer to question No. 7 you use the term nuchatra; what is that !—That is, more or less, a fortnight.
- 13. Q. You say in answer to question No. 9 " no special measures are required for private works, as the zamindars themselves keep their bunds in order." Is that general? Are there any complaints on the subject?—In the Bihar Sub-division there are no complaints. The bhack system Sub-division there are no complaints. The bhaoli system is in force there, and it is to the interest of the landlord to keep op the supply of irrigation.
- 14. Q. The bhaoli system is payment of the tenant in kind?—Yes.
- 15. Q. A proportion, not a fixed quantity?—There are varying arrangements according to which it is paid; sometimes according to proportion; sometimes by provious assessment.
- 16. Q. It is all called bhaolit-Yes, it is a general term for payment in kind.
- 17. Q. (Mr. Mair-Mackenzie.) Sometimes the tenant rays so many maunds !- Yes, in some cases after it has oeen settled what the proposed result will be.
- 18. Q. (Mr. Allen.)-It is called by different names?-Yes.
- 19. Q. (The President.)—You say in answer to question No. 8— As for Bibar, the whole sub-division is most keenly No. 3 -- AS LOS DIBER, the Whole sub-division is these Reonly alive to the concervation of water, not simply for the increase of produce, but for getting any produce at all." Where do they get their water from now; the Sone Caual or where?—Bilmar is, entirely watered by rivers that flow from the Gyn District, with a northerly and easterly trond; from the livers pains are taken and then reservoirs are constructed. From these reservoirs expenses channels load 4.4 the stracted; from these reservoirs separate channels lead to the tields.
- 20. Q. When you talk about zamiadars keeping the bunds in order, do you mean bunds across the rivers ?-I allude to bunds of reservoirs, not of rivers.

- 21. Q. Who makes the bunds ?- Zamindars.
- 22. Q. Is that done satisfactorily generally ?—I cannot say; the only way we are concerned with it is that it is a source of constant quarrels between the neighbour-
- 23. Q. Do you consider there is any necessity for legislation on the subject, in order to provent these disputes?—It is very difficult for me to say.
- 24. Q. You have not been long here, I recognize that ?— I certainly think it would be a good thing if the Collector had the power to interfere at the beginning if he thought it proper to do so; and when he thought he could settle a disputo which otherwise meant years of litigation.
- 25. Q. Has any ramindar the right to put a bund across a stream to divert water into his chanuel?—At present nothing new is done; it is laid down by prescriptive custom or decree of the High Court; overy bund has a dooree of the High Court about it.
- 26. Q. I didn't know whether there was a fixed number of bunds?—The number now is fixed. Any change at the prevent moment would be resented by every body.
- 27. Q. It must be a very rough-and-ready system as regards the proportion of water for distribution?—Yes, that is my impression.
- 28 Q. Are bunds made right across the rivers or are they merely directing groupes? I don't understand if the river is bunded right across again and again?—Usually they have a small channel which takes the overflow to the lower recohes; in some places the bund of a small river is stopped up entirely.
- 29. Q. You say in reply to the same question-" But I would recommend a thorough survey and examination of the schemo for a large recorvoir at Ghora Katora on the south of Bihar, whereby the entural drainage from the Gya range of hills could be utilized." Has this reservoir espan ange or mile could be unived. The time reservoir scheme been gone into at all?—It is at the extreme end of the range of hills in the Gya District, and about three years ago was examined by way of recommissance, after which it was proposed that a proper survey should be made; the then Collector has since left the district and left no note about it. I discovered it quite by neoident, and on looking up the papers found that it was proposed to irrigate 300 neres at a cost of Rs. 12,000; it could have been lot out at a rate of Rs. 5 per bigha. At present it is all scrub and jungle.
  - 80. Q. It is a small schemo?-Yes, quite small.
  - (Mr. Allen.)-For irrigating a Government estate.
- alt. Q. (The President.)—I suppose you would say as regards faming that your district is immune? Faming is not to be provided for to any great extent?—That is correct as a general statement. The South Bihar Sub-division is akin to the Gya District, and there are parts for which in past years a good deal of anxiety has been felt; the rest of the district is either on the bank of the Ganges or is commanded by the Sono Canal system. The district is practically immune from serious famine.
- 32. Q. Do the lands commanded by the Sone Canal system fetch a larger price than others?—I have no partionlar knowledge on the subject.
- 38 Q. Has the fact of steady, constant irrigation raised the quality of rice in these districts. We have heard in some places that a distinctly superior style of crop was grown?—The irrigated rice is very fine, but I cannot say how far it has improved.
- 34. Q. Have you any complaint of the mischief done by canal water, comparing the irrigation done by the Sono Canal with the irrigation by chars or wells? The reason I ask is that Mr. Tytler, formerly of the Onium Department, says in a noto—"Canal water is chiefly good for paddy, for which crop, however, it is, if irrigation is required, a necessity, as it fleeds the land, and paddy

. Mr. J. G. Cumming. 24 Oct. 02.

Cumming. -24 Oct. 02.

- Mr. J. G. thrives standing in water. For most other descriptions of orops it is more or less injurious, while the harm it does is progressive, icoreasing each year the water is 24 Oct. 02.

  Which for cereals and for the coil is barmful, hecause it which for cereals and for the coil is barmful, hecause it is colder than the atmosphere, nud so far as I know is devoid of fertilising properties owing to its pareness." Have you heard anything about this?—No.
  - 35. Q. Yon say in reply to question No. 11 that "well-cultivation is largely practised in the higher land for poppy and vegetables. Especially it is noticeable in the potate-growing area in the neighbourhead of Potaa." I suppose rice is never grown under wells?—I think not.
  - 36. Q. The greater part of your district is rice; it is hardly worth taking into account other crops?—All along the hank of the Ganges rice is the least important.
  - 37. Q. What other crops are there?—On the banks of the Gaugee they depend in the early spring, the rabi, crop They also have a very good bhadei.
  - 38. Q. Would they merely water from the overflow of the river?—Immediately to the south of the East Iudian Railway line ie a large tract which is fleeded almost overy year; that grows an excellent crop of rabi.
    - 39. Q. It does not require welle?—No.
  - 40. Q. Are there any takavi advances given for sells?—There is no demand for wells. I have tried to posh advancee, but there is no demand.
  - 41. Q. You say in roply to the last question—"I believe in offering joint advances to villages when they are hard pushed for water, in order to construct many temporary kachcha wells, but permanent wells must be left to the foresight of the zamindars or of the Local or District Board take an interest in mether 2. No not in wells for irrection. in irrigation matters ?-No, not in wells for irrigation.
  - 42. Q. Are these wells mostly for village purposes ?-Yes.
  - 43. Q. (Mr. Muir-Mackensie.)—You say in reply to question 5A "there is no record of a serious famine within the last 25 years." Is there any record of n previous famine?—I cannot find any.

- 44. Q. Has a record-of rights been introduced into the Patua District yet?-No.
- 45. Q. You sey there were these disputes about the management of the pains. Do you think the record-of-rights in woter might profitably be introduced at the same time as the record-of-rights in land ?—Yes. It would be n good thing to record the decisions as regards rights in water.
- 46. Q. Could that be dooe without legislation?—That is difficult for me to say. If I was a Settlement Officer, I would certainly do it.
  - 47. Q. You have been Sottlement Officor?-Yes.
- 48. Has it ever been your practice to record rights of water?-No, because the case did not arise.
- 49. Q. You say that the management of these bunds lead to disputes; if they have gone to the High Court for every important bund, what is there that remains to be disputed over?—They wou't respect the High Court's ruling. At the present time I have got a special police force in three villages.
- 50. Q. The special force is necessary to enforce the High Court ruling ?—Yes.
- 61. Q. Having regard to the existing amount of irrigation in these ports of the district, which ore not served by the Sone Canal, is thore much room for extension?— In the Bihm Sub-division, as far is my experience goes, I think we have done all that there is to be dooe.
- 52. Q. You don't think it would he worth while serveying the country to see if anything more could be done?— Certainly not.
- 53. Q. You don't think by o liheml provision of takavi that much extension would result?—I think not.
- 64. (The President.)—Have you got any famine works programmes?—We have no more than provision for the mising and repairing of existing roads.
- 55. Q. Is the District Engineer responsible for that ?—
  It is he who has prepared this.
- 56. Q. Is it kept up to date?—I have brought it up to date at the present time.

Witness No. 2.—Me. Ran Anugran Nabayan Singh, Deputy Collector, Patun.

Mr. Ram Anugrah Singh.

24 Oct. 02.

Note on legislative measures for interference of the Collector in the matter of irrigation disputes and imposition of irrigation cess.

I ngree with Mr. Oldham that to prevent disputes and breaches of the peace in the matter of irrigation dis-putes and in the interests of pooler and weaker landlords, the Collector's interference would be necessary. The richer zamindare as well as poorer zamindars would welcome the decision of the Collector who knows all about his district. His decision will be obtained at once and without cost cod save them the law'e delaye and rainous costs. The payment of small cess by lands protected by the canals and water-works and hencetted by them will not be gradged gradually, though there may be some pinch felt in the beginning. In a year of drought the gratitude must be nekoowlodged and payments of other years well recouped.

#### Note on Karamnassa-Bhabua Irrigation Water Scheme.

From what I know of Bhaban and the adjacent tracts of lands in Sasamm and United Provinces, I am very confident of the success of the scheme to catch the sarplas water of the Karamassa into a big reservoir or small reservoirs as may be decided upon professionelly by skilled engineers. There is a very large tract of land which is lying waste and which can be converted into good paddy-producing tracts by means of irrigation from the artificial

producing where an included in the same amount of certainty on regards other schemes,

#### Note on the Queries of the Irrigation Commission.

- 1. In my capocity as Deputy Collector and Mogistrate I know the districte of Saran, Gyn (including the Subdivisione of Anrangabad), Shobabad (with the Sub-divisions of Sasaram and Bhahoa), Champaron, Darbhonga and Putus where I hold lauded property.
- 2. It is monifest to every one interested in lend—land-lords, farmers, tenure-holders and teoants—that the canals and the village irrigation works consisting of water reser-

voirs, with conduits and other sorts of village channels, are great protection against famine.

- 3. The districts of the Patus Division to the south of the River Gauges, viz., Patue, Shahahad and Gya, are fortunate to have the Sone Causle besideen net-work of village irrigation channels, and so they are less limble to feel the pinch of famine and scoreity, except in portione of tracts where these facilities do not exist.
  - 4. (Q. 1.) Answered by District Officers.
- 5. (Q. 2.) High lands (hilly and jungli lands) where irrigation is not possible on neconnt of non-existence of wolls or water-courses are liable to famine or scoreity.
- 6. (Q. 3.) The circumstances vary in different districts generally; the kewal coil is enitable for paddy and wheat and the sandy soil is for bhadoi and rabi crops.
- 7. (Q. 4.) Generally on wells and upon the supply of water in the water-courses (dependent on rainfall) and upon the mointenance of the dams and banks of reservoirs.
  - 8. (Q. 5.) Charts furnished by District Officers.
  - 9. (Q. 6.) General answer.

Soll. Crop. Whee sown When reaped. Rice Low land Jnne-July. November-December. Highland { Bhadoi, May-Juac. maize. September October. Rabi, November March-April. Both (Rabi, November. wheat, December. gram.

10. (Q. 7.) General answer.

Bhadei crops (maize-Fwo), etc., from May to September. Kedo-Poriedical showers, May to September.

Aghani rice-Every nachchatra.

(Shown in tuble accompanying this note shewing agricul-tural operations in the year) except one from May to Soptomber.

Poppy—Continuous irrigation in Ostober, November and December.

Wheat-Light showers from October to January.

Rabi orops—Rain wanted in September, October and Docember.

Sngarcano-Specially in April, May and June.

11. (Q. 8.)-General.

Irrigation, as at present carried ont by local zamindars, is premature and in places dangerous to reads and railways. If the damming of streams in undulating country, reservoirs in hill tracts and minor canal schemes were carried out on engineering principles, they would be extremely beneficial and would avert to a great extent famines in future.

- 12. (Q. 9.) The District Boards might take over larger irrigation works in villages. Government may appoint a Special Irrigation Engineer to advise the Local District Engineer. Works of ordinary nature would, in most cases, be carried out by local rich landlords. Where poorer zamindars are concerned, a grant-in-aid by Government or District Board should suffice.
- 13. (Q. 10.) Alars or reservoirs are made in the undulating country by raising endaukments on three sides, the high side requiring none. Rain water is caught in these reservoirs and carried to fields by means of conduits or village channels. These reservoirs are constructed and controlled by zamindars. The small embankments often collapse when rainfall is heavy, especially when repairs are neglected. They are very premature in their make and sometimes source of great danger to reads and susceptible of great improvement. If made on originaring principles, they would be less expensive to the zamindar in the long run and prove works of great utility.
- (Q. 10x.) Reservoirs belong solely to zamindars, and no assistance is granted from Government.
- (Q. 10b.) No concession is given for construction of water reservoirs by zamindars.

- (Q. 10c.) Obstacles to extension of water-works.
  - (1) Want of knowledge as to the best means of utilising the water in the rivers, streams, etc., in the country.
  - (2) Want of assistance on behalf of Government.
  - (3) Want of means.
  - (4) Want of combication among local zamindars owing to after dispute or to the partition of water.
- (Q. 102.) No restriction of any kind is imposed by Government in the matter of the construction of new works. Streams are dammed haphazard, causing jealousies and often disputes between zamindars, which involve them in expensive law-suits.
  - 14. (Q. 11.) General.

Well cultivation is used in higher lands for poppy and vegetables.

- (Q. 11a.) The average depth of water varies very much. Generally it may be put down as 40 to 50 feet in the dry wenther.
- (Q. 11b.) Kachcha wells cost about Rs. 5 or Rs. 6. Good wells would cost about Rs. 100.
- (Q. 11c.) About 2 acres is the area commanded by one lever.
- (Q. 11d.) In very dry weather the water level is very much lower in wells than in other seasons, so the difficulty of keeping the water free for use increases. Good pakka wells do not dry up.
- (Q. 1)c.) The Opium Department makes advances for construction of new wells.
- (Q. 11f.) It is desirable to stimulate the construction of new wells by more liberal advances or inducements.

Mr. Ram Anugrah Narayan Singh.

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- 1. Q. (The President.)-You are Deputy Collector?-Yes.
- 2. Q. Of what district ?-I was in Patna. I um uoder orders to go to Muzafforpur.
- 3. Q. You say in your noto "I know the districts of Saran, Gyn (including the Sab-divisions of Aurangebad). Shahahad (with the Sub-divisions of Sasaram and Bhabna), Champeran, Derbhanga and Potna." In fact, you know the whole of this Division ?—Yes, except Muzassarpur.
- 4. Q. Have you come across famine ?-Yes.
- 5. Q. Whon was that ?-In 1878-1874.
- 6. Q. When Sir Riebard Temple was Lieutenent-Governor i—Yes.
- 7. Q. If the Sone Cauals had more water then they have would there be no icorcase of irrigation? Is there enfor the wants of Patco?—We wont more distributaries. Is there enough
- 8. Q. Would the people take the water?—Yes, where the distributaries reach the fields.
- 9. Q. If there was double the present amount of weter would there be double the area of irrigation?—Yes.
- 10. Q. Are you aware of ony had effects produced by this irrigation?—The canal water is very honoficial for paddy, but for rabi it is too oold.
- 11. Q. Are these carcals not . irrigated F-There is no extension of well irrigation. They depend on the dews of the winter months.
- 12. Q. You heard Mr. Cumming's evidence just now; is there anything you would add to it in connection with disputes !- I have only to say that all cases do not go to the High Court; only the rich zamindars can take them up; the poorer zamindars cannot go in for civil litigation; it is poorer zamindars cannot go in for civil litigation; it is very expensive, and they would hail with dolight the appointment of the Collector to decide disputes.
- 13. Q. You think some legislation would be of value? Yes. I have read with luterest o mper by Mr. Oldbom, Collector of Gya, and I know that several cases came before me where the poorer zamindars did saffer from the action of
- 14. Q. (Sir Thomas Higham.)—Are you speaking of Government canals !- No, private irrigation, embankments, Pains, otc.
- 15. Q. (The President.)—Is land more valuable on the Sone Canals than elsewhere?—The growth of raddy is assured just where the Sone Canal passes, and so the valoe has increased; that was not the case prior to the existence of the Sone Cauni.
- 16. Q. It is an insurance against unfavourable seasons?-Yes, exactly.
- 17. Q. You are aware that the cause have not returned much revenue to Government P—Yes.
- 18. Q. Supposing there are cases where conals are mode by Government to afford protection against famine or less of crop, but which would not be directly remunerative, take, for instance, a district like Bhabua Sub-division which suffers periodically, would the people there accept a cess as a sort of insurance in a year of drought?—In the first year or so it would not be liked, but in the long run it would be. In Bhabua there is a large tract of land that you could covert into paddy fields; if water is extended to that, the people will not begrudge a water cess.
- 10. Q. You say in reply to question No. 9 "the District Boards might take over larger irrigation works in villages. Government may appoint a special Irrigation Engineer to advise the Local District Engineer." Do you mean for purely small local works?—Yes, on account of ignorance on the part of the people, dams are put up haphozard which do considerable harm. An uninterested party should give pro-fessional advice as to where to put a dam, so that everyone would be benefitted.
- 20. Q. Would the zamindars accept the decision of the District Board in that matter?—They will accept the decision of the Collector. In Bihar he is always the Chairman of the District Board.
- 21. Q. Do you think District Poards might be induced to take more interest in irrigation P-They ought to, and I think they will.
- 22. Q. I suppose these rivers which go from the Gya hills must be very often silted up; is the silt eleared out by anyone ?- No; the old bods oud water-courses are cleared ont by the zamindars where they receive rents in kind.

- 23. Q. I suppose sometimes zamindors further down the Mr. Ram stream suffer?—Yes.

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- 24. Q. Coold District Boards interfere usofully in a case of that kind ?-Yes.
- 25. Q. (Sir Thomas Higham.)—You propose these minor irrigation works be taken over by District Boards. Do the District Boards in Beugal have irrigation works belonging to them P-Not at present.
- 26. Q. (The President.)—Mr. Alleu oxplains that the District Boards are precluded from interforing in irrigation' metters, as funds are all car-marked and there is no surplus.
- 27. Q. (Sir Thomas Higham.) Where would the district get the money from P—They have to lery a cess for the maintenance of roads.
- 28. Q. That would not apply to irrigation works?-We woot special legislation.
- 29. Q. In that case do you think the District Boards would be the proper agency P-Yes, at present they manage not only reads, but dispensaries, schoole, etc.
- 3). Q. Have District Boards to do with irrigation works?-Not of present.
- 31. Q. Would not the money obtained from the cess go to benefit only a very few individuals ?—Not necessarily; they maintain all the roads.
- 32. Q. I want to know where they are to get the money?—They realize cortain cesses by which they maintain roads, dispensaries, solvols, otc.
- 33. Q. But your irrigation works will be for the boucht of a few samudors, out for the benefit of the district as a whole ?- There will be better except.
- 31. Q. You propose to cess the whole district for the benefit of a few P—Whot I intend is for the benefit of those protected.
- 35. Q. Oat of the proceeds of the cess you propose to make the works?—Yes.
- 36. Q. You think there will be no difficulty in intro-ducing a cres of that kind?—No, the persons benefitted would pay.
  - 37. Q. That would require legislation? -Yes.
- 38. Q. You say no restriction is imposed in constructing on bunds?—No, the zamindar can construct a bund now bunds ?whorever he likes.
- 39. Q. If he outs off the supply from people lower work—Then he is prosecuted crimically under the Indian Penal Code.
- 40 Q. Is that not sufficient?—That is merely the thin ond of the wedge; litigation goes on and oosis lokhs and lokhs. If the Collector has the power to interfere, he would go to the spot and settle disputes; the people would bail with delight such a change of law. It would be been field to the year. ficial to the poor.
- 41. Q. Would you propose that no oue should be allowed to obstruct the stream without the permission of the Collector P—The Collector should have the power of inter-
- 42. Q. Will that not be after the mischief is done? zamindar knows when his rivel is going to put up a dam, and he would at once go to the Collector and sattle the matter. The Collector just now has not the power to do anything, except to issue an executive order to prevent a broach of the peace.
- 49. Q. (Mr. Muir-Mackensie.)—Do you thick that irrigation is capable of much extension in the tracts with which you are acquointed?—Yes.
- 44. Q. In which particularly !- In the Bhabua Subdivision of Potun
- 45. Q. Do you think irrigation could be much extended with adventage in Patna ? You.
- 46. Q. Mr. Cumming, the Collector, soid just now he did not think it could; that all hed been done that could be done?—He speke of another part.
- 47. Q. Could it be done by private effort, if money were advanced to the zamiadars?—Yes, I think so.
- 48. Q. You think they would be glad to take takevi?-
- 49. Q. Do you think the machinery for advancing money is satisfactory ?—No.
- 50. Q. Why do you think it is not ?- I think those who wish to give advances should go to the Mofusil and on the

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spot pay the people either in each or by cheque whichever was convenient.

51. Q. At present a man has some difficulty in getting an advance ?—Yes.

52. Q. He has to go to the Collector's office ?-Yes.

- 53. Q. And vory often that is at a considerable distance ?
- 54. Q. So that considerable delay results in his getting the money ?-Yes.
- 55 Q. Do you think the rate of interest requires reduc-
- 56. Q. (Mr. Rajaratna Mudaliar.)—The rate of interest is 61 per cent.?—Yes, that is fair.
- 57. Q. (Mr. Muir-Mackenzie.)—Is there room for extension of well irrigation?—Yes.
- 58. Q. Where in the Patas Dietrict?—My answer would apply to the six districts in which I have been. There is a great deal of room.
- 59. Q. What prevonts it extending now?-Want of monoy; want of enterprise; want of knowledge.
- 60. Q. Is want of capital the reason why irrigation does not extend?-Yos, that is one reason.
- 61. Q. The President asked you whother a cess would be cheerfully acquissed in if irrigation works were introduced. I don t think the President meant a general water-rate or cess on the land; there would be no objection to such a cross r-No, not on the land that benefitted.
- 62. Q. Would they be willing to pay revenue even in a year when they did not require water?—Yes, because prices would be raised in a famino year.
- 63. Q With regard to the management by District Boards of irrigation works, you don't think that would occasion a certain amount of delay !- Not noncessarily. In case of emergency the Listrict Board can pass orders in anticipation of sauction.
- 64. Q. le not the action of the Dietrict Boarde merely the action of the Collector ?-Not now.
- 65. Q. le an intelligent interest vory general?-Now it is becoming very general in Bengal.
- .66. Q. (Mr. Rajaratna Mudaliar.)—In the Pusish we hal evidence that the District Board management was a sailue. What reason bave you for believing that the Board management will be botter in these provinces?—I am not aware of the state of affairs in the Pusjab. I am humbly of opinion that the people take more interest in their affairs here, and if they get a good Coloctor, the mensure will be hailed with delight.
- 67. Q. Will they have the time to do it; they have dispensarice, schools, etc., already ?—Yes, plenty.
- 68. Q. Under your permanent cettlement what scope is there for interference by the District Board P-I'ho District Buards have already interfered by imposing a cess for roade
- 69. Q. I don't yot understand what scope there is for interference by the District Buarde?—I am also a zamindar myself; I am not speaking as a Government officer. I myself would not countenance the interference of Government in the imposition of a road cess. The same way when the zamindars find they are benefitted by protective irrigation works I don't think they will begrudge the amount of cess psychle for the land protected or benefitted. Where I receive renie in kind I would willingly pay myself; whore I receive them in each I would demur.
- 70. Q. In what way would the interference of the District Board be beneficial to the zamindar?—At present a man may construct a dam and prevout those further down from

- benefitting. If the Collector has to decide where to construct the dam, he will place it where both A and B can
- 71. Q. Cannot the zamindar bimself do'it in negotia-tion with the riparian rayate?—There will be jealousies and brawls.
- 72. Q. Do you think the District Board will he able manage without some increase of establishment?— That is a large question.
- 73. Q. In some of the papers we have found that rayats do not take water even if the canel is there. Has that ever happened in the course of your experience?—Very rarely. Water is often taken claudestinely and the irregation not shown in the returns.
  - 74. Q. Water is taken and not paid for ?- Yes.
  - 75. Q. Ie that carried on to a very large extent ?-No.
- 76. Q. Have you any agency for efficient sapervision?-Yes, but it is done claudestinely.
- 77. Q. Under your system the measurement and assessment on irrigated land is done by canal officers. Do you think it would be more efficient if that were transferred to the Revenue Department?—I agree with you that it would be more efficient
  - 78. Q. Would it be cheaper ?- I think it would.
- 79. Q. With regard to the construction of wells and . reservoirs, is there much scope for it in the districts in which you have served?—Yes, very much.
- 80. Q. Are there any facilities for zamindars or toaants to construct these works?—No.
- 81. Q. What facilities would you offer !- I would make advancee.
- 82. Q. Is there any difficulty on the part of the zamia
- 83. Q. If the law were amended?—Then with great delight the zamindars would pay as many cesses as you
- 84 Q. Cas an occapancy tenant construct a reservoir on his own estate?—Yes.
- 85. Q. The zamindar cannot come down upon him and fleece him?--No.
- 85. Q. As regards takavi, can you not take money with you and disburse it even now as the system exists?—There is nothing against it.
- 87 Q. You can draw bille and take a few hundred rapees -No. es; fresh legislation is not required for that 'purpose P
- 88. Q. (Mr. Allen.) You know Bhabus Sub-division? Yes,
- 89. Q. And you know the area is Shahahad irrigated from the Sone Casal. Can you compare the area before it was irrigated with Bhahna?—I don't remember what the area was like before irrigation.
- 90. Q. Is it your opinion from what you know of Bhabua that people would take water if it was provided !—Yes.
- 91. Q. Why?—I have seen in other places where irrigation works have been started and facilities given that they tako wator.
- 92. Q. Do you think water is badly needed there?—Yes, if you get water from Kammassa people will take it.
- 93. Q. Would they be willing to pay a war eimiler to that now made on the Sone Canal?—Yes. water-rate

WITNESS No. 3.-ME. E. MYLNE, Zaminder, Shahabad.

Mr. E. Mylne 24 Oct. 02. 1. Q. (The President.)—You have got great experience of this part of the country. You have known it for a number of years?—Yes. Since 1872.

2. Q. You have seen the whole rise and growth of the Sono Canal?—Yes. I have seen the henefits also.

3. Q. And you know the Bhahua Sub-division?—Yes, I know it very well.

A. O. You made a proposition or records the imination.

4. Q. You made a proposition as regards the irrigation of rice from five weirs?—Yes, that was is the year 1897 when we had famine.

5. Q. There was a note of Mr. Bookley's on the subject. I dare say you know all shout it?—Yes. I know all shout

6. Q. Have you any personal knowledge of the proposal for a big reservoir on the Karmanassa?—The proposal was made some years ago, about 1897, when I had charge of a large number of villagee in the place. It was shout 1897 when the people there were famine-stricken, and it was then that many zamindars came forward and begged me to say if we say that the people when the people were the proposed to the say of the say of the same forward and begged me to then that many xamindars came forward and orgged me to see if we could not by some means or another make use of the water running to waste; and seeing that the people there were, practically speaking, destitute, and seeing that the water was going waste, the natural forling was thet something should be done.

7. Q. You must have known Mr. Levinge very well?—

- 8. Q. Do you remember his talking about this big reservoir ?-Yes.
- 9. Q. The scheme, as far as I understand it, has not been thoroughly gone into scientifically ?—What is the use? We do not know what water is really available.
- 10. Q. And, as I understand, the crucial time is the watering from the 20th September to the 20th of October in the halia?—If you don't get water, then, practically speaking, work is useless, because one irrigation new brings the rice on when it is in the ear; and if we have no water new, then, practically speaking, rice from being 16 annay ran down to 4 annas.
- 11. Q. So that any irrigation scheme to be useful must give water in the katia ?—That is a sine qua uon.
- 12. Q. I undorstand that in your particular Sub-division (Bhabua) that supply is deficient?—Practically speaking, there is no irrigation there; the raysts are ulserably poor, and the estates are subdivided among so many ramindars, and some of them are so involved that there is no incentive for them to do anything.
- 13. Q. Bhabna is the same as the Sone tract was before 1678?—Precisely the same.
- 14. Q. Is there any well irrigation ?-Rayats have no mency for well irrigation.
- 15. Q. In rice irrigated on wells ? No Well, you may do it. A strong rayat does it.
- 16. Q. Is the country now a paddy country?—Bhahua is a country that will grow anything. It is very fine soil.
- 17. Q. Having this uncertainty about water, do the inhabitants turn to anything else i—What can they turn to? They are practically agriculturists, and there are large areas lying fallow simply for want of irrigation.
- 18. Q. Would it not be easy to device a system of giving takari advances to help them to make wells f—Well, the question is that in one village there may be 20 landholders, and which of them are you goinglto advance to? Then ugain mother difficulty about advance is that there is no security. The rayate are in such a miserable condition that no banias will advance them money.
- 19. Q. Are thore no big zamindars?—There are, practically speaking, four big zamindars, who own from 50 to 100 villages. Then again the Maharnja of Benares has estates there. It was he wlo was on the point of bunding the Karamases at his own cost, and we heard of that nud reported the matter to Mr. Bunraillon, and said that if that were done, Shahabad would not get water. Thereupon he wrote to the Commissioner of Benares There must have been something in it, if a man like Benares would rick his money on it.
- 20. Q. Supposing we are told that the Karamasas scheme is too expensive and is impracticable, why should not there be extensive well irrigation?—The hhadi system prevents this. The tenants will not make 2) mannes per bigha If they can help it, because half will go to the zamludar.
- 21. Q. Would ramindars take takani advances?—There is no incentive for the zamindar under Act 10 of 1685 to make any improrements, breause, practically speaking, enhancement has ceased. It is hedged round with such great difficultly state no ramindar will go in for improvements, because he knows thoro will be no return, and yet improvements are possible.
- 22. Q. It seems to be a curious deadlock if improvements are possible, and yet it does not pay any person to make them?—It pays a rayat if he is perfectly sound in his tenure.
- 23. Q. If he is a permanent rayat, would be take a taken advance?—Possibly he may, but then you see he has got in go to the Collector.
- 24. Q. I am supposing that the Collector gnes to him?— Then it might suit him to do so.
- 25. Q. You are quite well aware that large areas la India are irrigated by wells?—Possibly, but you see where you may lay on cauni water, wells rease.
- 26. Q. To go back to the Karminnassa scheme, I should like to know whether you think that any water stored there would be gladly availed of ?—No doubt.
- 27. Q. And would it be taken every year?- Yes, as in the Sone Canal.
- 28. Q. We have found in other places that seven years ont of ten nobinly wants the water. That has not been my experience in Shahabad, and that has been since 1872. Before that the area was then only limited; now it has been increased by the volume of water.

- 29. Q. (Mr.: Muir. Mackenzie.) You find the water useful every year practically P-Yes.
- 30. Q. (The President.)—Has there been any serious charge brought against the irrigation of Shahabad? I mean has fever been produced by it?—No, I don't think so.
- 31. Q. There was a notion that irrigation had increased the feverishness of the district?—That has not been my experience. The sub-sail drainage here is reay good; and if you go down 10 or 12 or 15 feet, you get into pebbly sand, and there is no case of water-logging that I know of. The drainage is very good.
- 83. Q. Have you any suggestions to make for the improvement of the administration?—No. I think things are working very smoothly. I don't think we can do any better.
- 33. Q. Is navigation very valuable to the district?—I don't think so. I think it was a mistake to have made these canals navigable at all. It was a mistake in the beginning, but we sll lanke mistakes.
- 31. Q. Even before the railway was introduced, navigation was not doing much service?—I don't think it amounted to much. Now that we have this other railway, the Gya-Mogulecrai Railway, navigation is still less required. I don't think the canals, as far as anylgation goes, pay in the district.
- 95. Q. (Mr. Muir-Muckenzie.)—I understand you to say that the bhavli tenure sots on obslacle to the undertaking of improvements by the rayat?—Yes, most distinctly.
- 36. Q. I don't quite understand why with the bhaoli tenuro there is no incentive in improvement by the ramindar. He will got an cubanced share of produce?—Yes, the zamindar makes the improvement, but it rests with the myst whether he will turn out a good crop or not, so that he is at the mercy of the rayat.
- 27. Q. And the rayat will not make proper use of the improvement?—No.
- 38. Q. On the other hand, with the naldi system you think the rayat will have some incentive to improvement?—Yes, provided he is an occupancy myst.
- 39. Q. And the zamindar will not ?-Certainly not. The Tenancy Act has stopped enhancement.
- 40. Q. There is one provision in the Tennney Act by which, if an improvement is made by the landlord, and at his expense, he is slowed to enhance the rent?—I think it is about 10 per cent. It is not very much. It is nervy small enhancement. I am not sure, but I think it is about that. The incentive to the ramindar is so little that I think I no right in saying that no ramindar will spend money in improving the status of the rayat.
- 41. Q. Then you consider that the Tenancy Act, even with that provision, has not enabled the raminder to take enhancements P—No. It is so hedged with difficulties. You have gut to go to the Civil Court before you get any enhancement, and that means, of course, money.
- 42. Q. There is no power to go to the Revenue Authorithe?—No, none. In fact, that Act has alienated the zamindar from the rayat. In the old days the zamindar and rayat were everywhere in a sort of partnership; now the zamindar says: "Why should I spend money on improvements; what is the good?" and I think he is quite right. There ought to be some incentive for him.
- 43. Q. Do you think that private works of irrigation might be more extended by more liberal advances of money ('alaci) by tinvernment?—I don't quite follow you. What do you mean by private?
- 41. Q. I mean such thinga as wells, ahars, etc.?—In that case you will have to deal with the rayat.
- 45. Q. Do you think the raynt would undertake more of these works if he had more money placed at his disposal by Government?—I don't think so.
- 46. Q. Why not?—Woll, you see, if a mad borrows from Government, he has a very haly drend of what will impren to him if he does not pay up. He may get round his makajun and put him off, but he cannot get round Government.
- 47. Q. You mean the system is too rigid ?—Yes.

  48. Q. (The President.)—Do you think you might have greater facilities given for leading monog?—Well, that question was once thought of in the Simbabad Division, but the difficulty was to get the rayat to go to the Coll ctor for money.
- 40. Q. If the Collector or a special officer went about with a bag of supers in his pocket?—Well, if he paid the anyat, the rayat would have to pay somebody else scener or later.

Mr. E. Mylne.

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- 50. Q. Haw da yau mean?—I mean to say the Collector would give a rayat money, and the rayat would have to make payments by instalments and things like that, which is harassing. With Gavernment you have many channels to go through before you get to the Collector.
- 51. Q. Supposing this is simplified?—There is always a disinclination for a rayat to ga to the Government for maney. I don't know why it is, but he has got an ungodly dread of doing so. If anything is done in regard to these irrigation cohemes, where it is possible it ongot to be dane by Government.
- 52. Q. (Mr. Muir-Mackenzie.)—That is for the big ones; but as regards the small ones, would you have Government undertake them too ?—Lthink the only thing is for Gavernment to take up the construction of small works.
- 53. Q. In other parts of India vory large sums of money are taken by rayats ?—They do so have with apium advances. They also take money to make wells, but that is not very generally reserted to.
- 54. Q. Why chauld there he mare repugnance here than alsewhere ?—I dan't knaw, but it is so.
- (Mr. Allon.)—The Opium Dapartment da advance money but it is very sparingly taken?
- (Witness.)—Of course you have to remember the haldings in Shahabad and Biharsre vary small, comparatively speaking. Yau wan't have a man having 50 acres of a halding.
- 55. Q. (Mr. Muir-Mackenzie.)—In some parts there are a cansidorable number of wells !—Yes.
- 56. Q. Do you think these wells are made with borrowed manay?—Possibly these wells are made with borrowed money, hat it requires a very strong rayat to make a well.
- 57. Q. What is the district with which you are most familiar P-Shahahad.
- 58. Q. And haw deep are welle there?—They run from 20 to 60 feet. The average depth may be taken at about 40 fest.
- 59. Q. And what sort of wolls are they ?-All sorts of wells.
- 60. Q. What is the motbod of construction generally P—Well, they have olther to make it pakka with lime and mortar, or simply with two rows of bricks.
- 61. Q. What is the cost of construction of a pakka well?—Well, it should run from Re. 100 to Rs. 150.
- 62. Q You mean with lime and mortar?-No, that would cost mare.
- 63. Q. Then what you mean; is that a kacheha well costs from Re. 100 to Rs. 160?—Yes.
  - 64. Q. A pakka well would cost much more ?-Yes.
- 65. Q. How much more? Would it run to Rs. 1,000?—Na. It would cost probably double the cost of a kachcha well.
- 66. Q. Would that be a dauble mat woll?—Yes. There are one mot wells here, two mat and four mot ones. I am talking of a twa mat well.
- 67. Q. How much would that well irrigate ?-20 to 25 bighas.
- 68. Q. A bigha being how much ?- 5ths of an aerc.
- 69. Q. With what sort of crap ?—A mixed crop, i.e., rabi, sugaroane, rice.
- 70. Q. (Mr. Allen.)—What do yan say is the area irrigated by a woll?—About 20 to 25 bighas.
  - 71. Q. All the year round ?- Yes.
- 72. Q. There is an extraordinary variation in the areas in different parts of Indus?—Yes. Even in Shahabad there is a great variation. In some places water is found very near the surface; in other places you get it very low down.
- 73. Q. You have been speaking of a two mat well?— Yes. It does not pay a man to make a one mot well.
- 74. Q. (Mr. Muir-Mackensic.)—Have you any experience of the total amount of unirrigated sugarcane?—This is not known in Shahabad. It is not heard of.
  - 75. Q. You are not nwere of it?—No.
- 76. Q. (Mr. Rajaratna Mudaliar.)—What is the size of these twa mot wells?—Well, I enppase about 6 or 7 feet in diameter.
- 77. Q. You said that in the case of the Sone Canals, south of Patna, the water-rate is paid by the tenants. Don't you

- think whore a zamindar gots an enhanced share of the produce, he should pay a proportion of the water-rate?—But where does he get an enhanced share of the produce?
- 78. Q. The tonant divides the praduce with the zamindar?—That is under the bhaoli system. In Shahabad bhaoli is an exception.
- 79. Q. Where there is the bhaoli system, should not the zamindar ply a share of the water-rate?—As I have already said, there is no incentive to a zamindar to do that.
- 80. Q. Supposing Government constructs a canal in Bhahus, who will pay the water-rate?—The rayat who uses the water.
- 81. Q. And the zamindar will get an enhanced share af the produce?—He will take his chance of gotting that share or not.
- sanare or not.

  62. Q. Will not Govornment be justified in levying a portion of the water-rate from him also ?—They will never agree to that. Yau see it would be a compulsary cess, ands the zamiudars will be up in arms at once, because it mean, another Gavernment revenua. Many years aga, I think it was in 1870, there was a talk of a compalsory cess on the land-owner, but it was quickly drapped.
- 83. Q. Yan cannot call this a campulsory cess. Gevornment gives you water and enables you to levy an enhanced share of the produce from the rayat?—Supposing the zamindar does not want the water, then it is comenlary.
- 84. Q. But tenants may want it?-Then the tenants should pay for it.
- 85. Q. Under the share system a zamindar gets half the produce of his tonant, which is much mare with irrigation than without irrigation?—Yes, hat as I said befare, the enhancement of the crops lies entirely in the hands of the rayst. Supposing he will not cultivate, where is the remedy?
- 86. Q. So long as he pays the water-rate he will take care to reimhurse himself?—That is a supposition, but I don't think the question of compulsory area will come in at all. If the schemes you epeak of could be possible, the rayats themselves would willingly take the water and pay the present case now paid on the Sane Canal.
- 87. Q. The difficulty only arises under the sharing system ?-That would right itself in time.
- BS. Q. (The President.)—Has that system decreased since the Sone Canals have been in operation—I mean the bhacki system ?—Yes, it will settle itself. The raynt himself now under the law can go to the Collector and commute his bhacki into nakdi, so that if the water came, I am sure he wanld go to the Callector and say "I want my bhacki made into nakdi.
- 89. Q. Is it within your knawledge that bhacli has come to an end in the irrigated area?—Yes, bhacli has ceased.
- 90. Q. Mr. Ram Narnyan Singh suggested that the District Board might take aver the management of the irrigation warks. What is your opinion upon that point?—We could not dati better than it is done by the irrigation officers. Why saddle the District Board with this? They have enough to do with reads, dispensaries and schools; why saddle them with these minar schemes of irrigation?
- 91. Q. (Mr. Muir-Mackenzie.)—Yau said that there was a very full demand for all the water that the Sone Canal could give?—Yee.
  - 92. Q. At present rates ?-Yes.
- 93. Q. Da you think that Government would be justified in taking any higher rates?—Well, Government have just dene that. They have added on five annas a bigha.
- 94. Q. Yau think they have gone as high as they ought to ga?—I would not like to say that. I believe a very much larger area can be irrigated than is being-irrigated
- 95. Q. Do yau think water is wasted?—Well, I would not say that. It is improvidently used by the rayat. It would go a very much langer distance if it were carefully used. They naw damage their awn crops by the abuse of water.
- 96. Q. Hava you any idea as ta how it could be regalated?
  —'That brings in the question of irrigation channels, and
  that also brings in the question to wham should those
  channels belong—whether to the zamindar or to Government. If the subsidiary channels belong to Government, it
  would add very much more work to the irrigation officers
  but I believe a good deal more irrigation could be attained.

Of course, so far as we know, at least that is my personal opinion, that the duty of the water has not reached its maximum owing of course to the distribution which will be learnt in time.

- 97. Q. What facilities do you think a landlord ought to have to enable him to got an enhancement in respect of an improvement executed by him?—Well, I think there should be some inexpensive method through the Revenae Authorities or the Collector, whereby he should get a fair return of the capital sunk by him in improvements.
- 98. Q. Would you like the Revenue officer to estimate the value of the improvement and what increased rent it would be justifiable to charge in respect of it P—Yes, something to avoid assless litigation and costs.

99. Q. You mean a more summary remedy ?—Yes, and a summary remedy which would give the zamindar an incentive to sink money, and they would do it if they could; but now you will not get any zamindar to spead a courie on improvements. Now, if he spends any money on improvements, he has to go to the Civil Coart for onhancement of rent, and when he gets it, it is a very small return for the money he has speat.

the money he has speat.

100. Q. Do you think he would get a better return from the Revenus officer P—He would get more oven justice. The Revenue efficer could see what the land could give and estimate the value of the improvements and then fix the amount of cahancoment. Now one has to go to the Civil Court, and then you are not sare of what you are going to get, or whether you will get any return on the money you lay out on improvement.

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# WITNESS No. 4.—Ma. S. Shabafuddin, Barrister-at-Law and Zamindar.

- 1. Q. (The President.)—You are, I understand, a barrister ?—Yes.
  - 2. Q. And you are also a land-owner P-Yos.
- 3. Q. Have you been resident here for a long time?—I was been here, or rather a few miles from here, so it is my home.
- 4. Q. You have soon all the changes that have been brought about by the introduction of the Sone Canals ? You have lands here?—Mostly in Shahebad.
- 5. Q. Is your opinion in favour of the irrigation that has been done? Has it been a boon to the country?—Entirely so. I am entirely in favour of the irrigation done.
- G. Q. Do you think, if water could be found, it would be desirable to extend it?—I should think so. In 1872 or 1873, before the introduction of the Sone Canal, the property that I now hold with some of the shareholders fetched about 14s. 8,000 a year. Now, after the introduction of the Sone Canal and after the improvements we have made on the property, the highest income that we have got hus been like 23,000.
- 7. Q. Do your tonants pay bhaoli or nakdi?—In the mauzaha I am interested in it is all bhaoli, except of course for sugarcane and poppy, for which we generally get nakdi. In Patna and Gya the bhaoli system mostly prevails.
- 8. Q. Ilave you anything to suggest in the way of extending irrigation in Patna !—That requires a scientific knowledge.
- 9. Q. What would you say ? There is, I understand, a great deal of irrigation done by the streams which come down from the Gya kills?—Minor irrigation.
- 10. Q. Is that satisfactory?—Well, to some extent it is.
- 11. Q. I suppose it is very ancient and done for a long time?—A very long time.
- 12. Q. Does it work satisfactorily, or is there any improvement wanted there?—Improvements are wanted no doubt in the shape of repairing the old pains, throwing up earthworks and bringing water, and then owing to the change of the course of its streams it has become necessary to dig out new pains.
- 18. Q. That is, I suppose, because the subject has not been scientifically treated !--Quite se, Sir.
- 14. Q. These pains are the property of the zamindars who reap the benefit from them mostly ?—No douts, and of course in olden times they had not much knowledge.
- 15. Q. Do they now omploy professional advice !- Very seldom.
- 16. Q. Are there any engineers making their liveliheeds by assisting zamindars la such eases?—Since we have get a surveying school here we pass out a good many candidates as surveyors and everseers, who are doing some good to the centry by giving advice to the zamindars, but these instances are not general.
- 17. Q. But there is not a livelihood to be made from it. If an engineer settled in Pataa, who was known as a good professional man, would be be able to make a livelihood out of it?—I don't think so.
- 18. Q. We have heard complaints made of the disputes upon these pains and the inconvenience of having to take them before the Civil Courts. Do you think there is any

- remedy to be found for it in legislation? Have you anything to suggest to make that easier ?—I think legislation Sharafuddin, in this respect would certainly be a boon to the country.
- 10. Q. In what direction would you legislate?—In order that there should be facility in leading water to a place where at present they don't get any water.
- 20. Q. That is, passing the water through the lands of another man?—Yes, Sir. There should be a system of land acquisition for the purpose of small chaesels to be taken to private property.
- 21. Q. That does not exist in the pains ?-I don't think there is any instance that may be quoted in this district.
- 22. Q. Would there be any advantage in strengthening the anthority of the Collector of the District by glving him anthority to settle disputes?—That would be an easier way than going to the Civil Court,
- 23. Q. Would that be a popular way ?-It ought to be.
- 24. Q. Would it be?—I don't think it would be very popular, but it ought to be. You see the people are so very conservative. They want to fell book to their old system. If a new thing were to be introduced, they all fly from it. They don't like any innovation.
- 25. Q. Do you know the Bhabua Snb-division in Shahabad?—No. I have been there only once.
- 26. Q. (Alr. Muir-Mackenzie.)—Can you tell mowhy it is that the bhacti rents on your estate have not been commuted, while there is such a tendency in the Shahabed District towards commutation?—I think by having the bhacti system in this part of the country there is protection given both to the zamindars and to the rayats in seasons of scarcity of water.
- 27. Q. Yes, but then I suppose the same arguments would apply in the Shahabad District; would it act?—There is a difference there; they have got the Sene Canals.
- 28. Q. I thought you said you bad the Sone Canals too ?— No, only some few distributaries just at the extreme end of the Patua District.
- 29. Q. How is it you have succeeded in maintaining the bhaoli system on your estate?—In the first place, I have to pay about Rs. 2,000 a year for the water that I take to my village in the Sbahabad District. I don't trouble the tenants; I pay it all myself and by easy instalments; I realise from my tonants half of it. That may be one of the reasons.
- 80. Q. (Mr. Rajaratna Mudaliar.)—You take also half the water-rate?—Yes, but I do that by very easy instalments.
- 31. Q. (The President.)—Are the water-rates high?—I don't think so—I mean to say, comparing the produce we get, they are not high at all.
- 32. Q. (Mr. Allen.)—Is it common for landlords to pay half the water-rates P—I think there are only one or two exceptions that do it. There are very few who do it. Although there is a rule of a cortain commission being allowed to zamindars if they realise it from the tonasts and pay it to Government, but very few do it. I, as a raminder, Ipay my own rates, and also realise them from the tenants.
- 33. Q. (Mr. Muir-Mackenzie.)—Would you say this that, where the bhacli system exists, a zamindar last considerable facentive to improve his lands P—No doubt.

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#### WITNESS No. 5 .- MR. F. AINELIE, Suh-divisional Officer of Bihar.

- Mr. 1. Q. (The President.)—Have you been long here?—F. Ainslie. About ten months.
- 2. Q. And where were you before?-Monghyr wes the 21 Oct. 02. last place.
  - 3. Q. Have you any irrigation in the Sub-division?— We have irrigation by pains throughout the Sub-division.
  - 4. Q. Your streams come down from the Chota Nagpur hille, I presume?—Our rivers all come from the Gya Dis-
  - 5. Q. Is there much trauble in the management of those pains?—On the whole it goes smoothly.
  - 6. Q. Do you think legislation is decimble?—I think it is nesosary. I have seen several cases in which there are several co-shurers in a village where some of them will not do their daty in regard to repairing water channels, and in those villages the irrigation is not whot it should he.
    - 7. Q. That is, the rayats?-Ne, among the zamindare.
  - 8. Q. What do you propose?—To place all pains under the Collector we have some Government estates in which we have only u chare of the village, and we find some difficulty in getting our co-sharers to do their daty. Of course we are in a hetter position than other zamindars, and we can do their work and call upon them to pay their share, but even then we find a difficulty.
  - 9. Q. Would you give the Collector cammary powers?—Certainly.
  - 10. Q. Among works required to be kept in order, de you include the clearance of pains and repairs of ahars?—Yes,

and alangs too; they are emhankments for keeping in the water, as the pains, as a rale, are not very doep. If the alang were not there, the water would overflow.

- 11. Q. These pains are of very varying size, I euppose?

  —Ye, none of them are very hig. I have crossed one in the rains several times, and I have never seen it more than neck-deep. And it vie out of the common. And it would be about 50 feet wide. That
- 12. Q. Do not these pains occasionally got out of order and do mischiel?—No, they do not do muon mischiel. If the people find too much water coming into the pain, they put up an embaakmeat at the mouth of it; it is very easy to close it.
- 13. Q. What is your opinion us to giving advances for private irrigation works?—So far as the Bihar Suh-division is coocerned, the rayats would not he willing. They look to the zamindar as the proper person to make and keep up
- 14. Q. Does the zamindar ever take it up?—Sometimes, bat he is diffident.
- 15. Q. Do you think the District Boards could profitably control the irrigotion works?—I think not; it is out of their province.
- 16. Q. (Mr. Muir-Mackenzie.)—Have you the power to grant advances?—I had during the famine of 1897 in the Gobladpar Sah-division of the Manhhum District. I do not know whether I have the power now. I have given one or two loans for cattle, seed and agricoltaral implements, but not for irrigational purposes in my present subdivision. division.

# WITKESS No. 6 .- MR. A. OGILVY, Manager, Court of Warde, Gya.

Mr. 1. Q. (The President.)—I managed the Tikari Raj in A. Ogilty. tha Gya District for 16th years.

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- 2. Q. Is Gya a district in which there is any urgent need of irrigation?—It is dependent entirely on irrigation. The works are protective and are necessary for the rice. The works are protected and are necessity for the rect.

  I have known only one year in which irrigatian works were absolutely disregarded. There are ahars for the protected portion, pains for the immune portion.

  I remember only one year in which the pains failed. As a rule, there is always enough to cave the rice. The pains depend on the rains from the Chota Nagpur slopes.
- 3. Q. Are these counted on as infallible?—Yes, and there is elways a large percolation going ou, even if the river hed is dry.
- 4, Q. You say the district doponds altogether on irrigation. If the irrigation were to stop, would the people take to dry crops?—To a certain extent.
- 5. Q. Does the rabi form any appreciable part of the cultivation of the district P-Wo used to calculate about eix annas of rabi and ten of rice.
- 6. Q. Is legislation desirable as regards the maintenance of these pains?—It is desirable for the construction of pains; the Collector ought to have power to acquire lands, where necessary, for the construction of a pain which he may think is for the common good.
  - 7. Q. Has he not that naw ?-I think nat.
- 8. Q. What is your feeling about the imposition of a water aces upon laads protected by works coastracted by Government?—I don't think it necessary for Gya, hecause these irrigation works or not purely protective. They are re-productive; very mach so. The zamindars would jamp at any help or idea of co-operation from Government.
- 9. Q. Do wells bear any part in it?—Very slight; they are only used for poppy and sugarcane.
- 10. Q. Havo you much experience of takavi advances?
  Only in the Raj, and that was not for improvements, only for distress.
- 11. Q. (Mr. Muir-Mackenzie.) Whot rate of interest did you charge ?-Nothing.
- and you charge r—Nothing.

  12. Q. (The President)—Now you are at Chupra. Is that as dependent on irrigation as Gyn?—Not assily. The works are not remunerative as they ore in Gya; that conditions are different: Gya has a tremendous slope and Chapra next to uone. In Gyn the water can be laid ou practically where you want it. In Chupra it is a matter of difficulty.
- 13. Q. Are the seasons more favourable in Chupra than in Gya?—The rainfall does not differ very much,

but the district being flatter, the rainfell goes further. In Gya the alope is so great that without works the rainfall goes off at once. That is the distinctive feature of Gya.

- 14. Q. It makes it all the more remarkable to me that these pains can be administered and controlled without some technical knowledge?—When they are first constructed, I have no daabt the levels are faulty, but they very soon correct themselves.
- 15. Q. (Sir Thomas Higham.)—Have you ever constructed any new pains in connection with the Wards estales?—Yes, about half a mile of a pain was washed away and we had to make practically a new work.
- 16. Q. And was that entirely for the benefit of the Wards estates P—Yee, but there were one or two other villages which got the benefit equally with ac.
- 17. Q. Did they help at all? We had to eas them for contribution.
- 18. Q. Have you found the expenditure an each works productive P-Tremendonsly.
- 19. Q. It gives you a good retarn?—Immediately. You may calculate on SO per cent.
- 20. Q. That does not indace the private owner to extend them P.—They cannot extand them, because they cannot got the necessary land.
- 21. Q. Some of these pains which irrigala the Wards extatas also irrigata a great many other estates P—When they were originally made they were made by the Tikari Raj, and all the vulages originally belooged to the Tikari Raj. Some have passed away out of the estate and others may have been given away as jagire.
- 22. Q. Do you find any diffically in getting what you want done on them owing to other partners?—In the Tekeri Raj the management of these pains has all been recorded in an irrigation book which is now such ancient history that it is accepted by everybody, and within the limits of the recorded righte of each villago there is no very great difficulty arising. very great difficulty arising.
- 23. Q. You mast have one controlling body, there is no doubt of it?—I sometimes have to take a strong hand.
  - 24. Q. Personal inflaence, I suppose?-Yes.
- 25. Q. (Mr. Muir-Mackenzie.)-What was the result to the orops in that year when the pains failed ?-We lost very largely in the villages that were served by pains, hat, cariously enough, the villages that were served by chars only had a better crop that year.
- 26. Q. Can you ascount for it?—The villages served by pains did not keep enough abars—enough atorage.

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- 27. Q. If they were kept up in connection with the pains, that night be an advantage?—It is difficult to get the room. As a rule, there is so space for it. It would practically mean taking land out of more profitable cultivation, and with the cost of the extra storage it would not be mathy while. be worth while.
- 28. Q. And what measures did you take when the pains failed ?—We could do nothing.
- 29. Q. You did not dig into the rivers ?-We worked them as long as we could get anything out of the river.
- 30. Q. Have you made many wells?—Yes, a great many in Tikari, but they are very expensive. I remember ooo oost Rs. 1,300. It was 70 feet dry. It was not for irrigation.
- 31. Q. But do you make many wells for irrigational purposes ?—Not so many; a few.
- 32. Q. What did they cost you—say, a well with two mots?—Vory few mots are used io Gya District; all

levers. It depends entirely on the situation. Close to the river bank it might be made very cheaply; a kachcha woll could be done for Re. 80 or Rs. 90, and a pakka well for Rs. 200, brick-lined.

33. Q. And on the higher land do you have to go through rock ?—No, but very hard clay, generally about 40 feet. That would cost for a pakka well four or five hundred rupees. We should not make these for irrigation purposes.

84. Q. And what have you grown with them P—Chiefly sugarcane, specially valuable crops. We should not make them merely for rabi.

25. Q. (Mr. Rajaratna Mudaliar.)—Who keeps the pains ia repair?—The Raj kept the pains io repair on its own estate.

35. Q. Did the villages contribute any labour ?—The only labour the villages contributed, which is termed goans, was merely as much work as they could do with shoir hands or some rough instrument, not using kodalis.

#### WITNESS No. 7.-MB. S. M. NASIAUDDIN, Snb-divisional Officer, Jahanabad, Gya.

- 1. Q. (The President.)-I have been bero over two
- 2. Q. Yon were on the Sono Canal?—Yes. My duty was to collect the water-rates in the districts of Shahabad, Patna and Gya. I was over six years occupied in that work; and during that time the revenue gradually increased. When there was scanty rainfall the canal revenue increased, and when there was plenty of rainfall less canal water had to be appointed. had to be supplied.
- 3. Q. If the Sone Cauals had double the water they have, would you have gone on increasing in the same way in revenue. Was there always a demand for water?—I think so; in the beginning we should have made it of more
- 4. Q. But if there is no more water in the river ?—If Sone gave us more water, we could double the quantity.
  - 5. Q. All the water was consumed?-Yes.
- 6. Q. Was there any complaint made of the water-rates being too high?—They were always complaining whether it was right for them to complain or not.
- 7. Q. The rates were raised?—Yee, more than once; but they paid every pice of it. The Sone revenue has been cellected cent. per cent.
- 8. Q. But it has never paid interest on the capital expended on it. Would it be fair to lay a cess upon the whole district, because the people were saved from famine, whether they took water or not?—It would be fair, but the people would not willingly accept it.
- 9. Q. Was the navigation much oppreciated on the Sone Canals?—No. Since the opening of the railway it has been entirely abandoned.
- 10. Q. Would it have otherwise increased ?been having fresh and better roads, and I think people would have employed bullock earts rather than boats.
- 11. Q. Do you know the Bhabua Sub-division of Shab-bad?—I did not have charge of it; hut as Deputy · Collector, I had to deal with part of it.
- 12. Q. In your position as Deputy Collector of the Sone Canals had you acything to do with the measurement of the crop ?—No, that was done by the Public Works Depart-
- 13. Q. (Mr. Muir-Mackenzie.) Had you anything to do with the granting of remissions?—Only in the case where items were "irrecoverable." When my procedure by cortificate failed I had powor to remit.
- 14. Q. (The President.)—Supposing you have a katauni to collect revenue, and the mau says "I never had water; it is a mistako"? Where did he take his complaint?—To the Executive Engineer or Collector.
- 15. Q. Do you think the system worked well?-Very well.
- 16. Q. There were no complaints that the Executive Engineers were too harsh?—No. Where wastage rate was charged, it was discretionary to impose the maximum or the iotermediate rate.
- 17. Q. Did-they often appeal from the Executivo Engineer to the Collector?—Not often.

- 18. Q. Can you suggest any improvement in the adminis- Mr. S. M. tration of the works of the Sone Canals to make them do Nasiruddin. their function better than they do now ?-I think it works as well as it ought to do. There is a season when water is allowed to escape from the canals. It goes away for nothing. Why not let it go somewhere, say, in ahars or tanks, to be used for drinking or for irrigation inetead of throwing it away; that is, if there were no engineering difficulties, and charge a small rate.
- 19. Q. Do they not fill village taoks when there is water to epare?—When application is made it is done.
  - 20. Q. And oharged P-I think not.
- 21. Q. Do you think that legislation is necessary for the proper control of pains?—I am strongly of opinion that legislation is necessary. I find difficulties in keeping proper control in keeping people from fights and riotings. This is exactly the season when fights do occur. I have to be always on the look-out. Say there is a pain which receives water from a certain stream. It goes on, say, a mile, and there are many other pains that take supplies from this parcot pain. Then at one place it branches off to the light hand and at the same time to the left; suppose the land of the owner on the right side is on a high lavel. the land of the owner on the right side is on a high level, and that on the left at a low level: well, the land on the right belongs to one man and the land on the left to another, then the man whose land is on the low level is always on the lock-oot to dig and deepen the branch leading to his land. By doing that, every drop of water that comes to the mouth will necessarily go on to the left hand side. Can one stop him so digging on to his own land is a question? Case law is so very donhtful about it that we have to be almost silent. The people decide the case by force, and then we have to try a case of murder or riot. A record-of-rights should be made first of all. should be made first of all.
- 22. Q. (Sir Thomas Higham.)—You think it is a pity the capacity of the Sone Canals was not increased?—Yes, provided Sone has the water.
  - 23. Q. But has it?-It is for engiaeers to say that.
- 24. Q. Engineers say the capacity of the canal is limited by what it can give doring the fifteen days in October, when every acro of rice requires water. Is their crop ruined if they don't have it?—Not exactly ruined, but the outturn would be less than it ought to he.
- 25. Q. If they can spread the irrigation over 25 days instead of 15, they could icorease the srea of irrigation in that way?—In quantity, not quality. I think more water should be given them. I do not agree with officers who charge the tonants with waste of water.
- 26. Q. Water should be given oftenser and more in quantity?—Yes.
- 27. Q. (The President.)—But if you cannot get the water out of the river P-Well, it is a pity. Old and expert tenants think more frequent watering and keeping it a little longer will improve the crop.
- 23. Q. (Sir Thomas Higham.)—How often do they get water for an aero of rice—once a week P—I cannot say, but not so often, as the onlivators apply for it.
- 28. Q. What is the rule about remissions in case of failure of supplies?—That is settled by the engineers and their orders are appealable to Collectors.

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Mr. S. M. 30. Q. (Mr. Muir-Mackenzie.)—I anderstood your Nasiruddin. brother (Mr. Sharfuddin, Barrister-at-Luw) to say that, as zamindar, he pays the whole of the rate?—Yes, he does.

- 31. Q. Did he nudertake to do that ?—He applied under a epecial provision in the rulea for the water-rote to be paid by one contractor. He becomes the contractor and is entitled to recover a half share from the tenants. But that is only done where the zamindar is on very good terms with his tenants.
- 32. Q. He kept up the bhaoli system?—Yes. To commute the bhaoli into nakdi the ramindar will fight to have a fair each rent, and that would be rather too much for them to pay in cash; it is easier for them to pay in kind.
- 33. Q. But how do you account for the very considerable commutations that have occurred in other parts of the canal ?—The commutations have not occurred in the arca irrigated by canale. In Shahahad, as a rale, the whole district has been always nakdi, except in a few cases. In the case of my brother's property it has been bhaoli.

34. Q. (Mr. Rajaratna Mudaliar.)—What is the total amount you collect in your division?—From eight to twelve lakhs according to the water supplied.

35. Q. What etaff had you?—Two Doputy Collectors as my assistants, besides a very hig office, and the division was divided into ten circles, each with a circle officer, and for each circle officer there was n cortain number of tahsildars and peons to collect.

36. Q. What was the total cost?—It was very high, but now they have reduced it.

37. Q. Have there been many cases of charges for waste water in year time?—Not many.

38. Q. What is waste water  $\hat{r}$ —A man who has never applied for water may take water from one who has been granted it.

39. Q. Surreptitious irrigation P-Yos.

WITKESS No. 8 .- Mr. C. E. A. W. OLDHAM, Collector of Gya.

(Replies to printed questions.)

## -GENERAL.

Mr. C. E. A. N. Oldham.

1. The answers below rofer to the district of Gyn.

B. Oldham.

24 Oct. 02

As the district officer of the district for about four years,

I have toured through it in all purts and have devoted
much time to making myself acquaiated with the various methods of irrigation.

2. The statement marked "A" shows the average rainfall per menth at the bend-quarters attain of the fear sub-divisions in the district.

3. The following obstacles exist in this district.

(The answers here are independent of the arrangement of the question) :-

(1) The epaisity of population in the jungly and hilly tracts in the southern part of the district.

(2) The thriftless character of the people.

(2) The thriftess character of the people.

(3) Want of education and enlightenment among the land-helding classes, who should initiate measures for the improvement of irrigation. Owing to the general provalence of produce reats in this district end to the physical and elimotic conditions that necessitate the up-keep of artificial works of irrigation, the duty of maintaining and inaugurating irrigation works lies to a peculiar extent upon the landlords, who are, however, unfortunately so bnekward and often so blind to their own real interests that they do not undertake such works.

(4) Lack of capital for the lastial expenditure.

(4) Lack of expital for the lastial expenditure.

(5) Insufficiency of water-supply for any extensive projects due to physical conditions. The district is hounded all along the south by the high lands of the plateau of Chots Nugpur and the numerous spurs of hills that project from this plateau. The general slope of the district in from south to north towards the Ganges, and this slope is comparatively rapid. A large number of hill streams issue from these high lands and flow across the district from south to north. In the rains these are swellou torreats that carry with them quantities of gravel and floe sand that are deposited in the heds lower down. These streams are ac rapid and the beds so sandy that within a few meaths, sometimes within a few weeks, of the cossition of the rains, the beda are almost dry. The rainfall is also small, and the surface dmiaage, except where blocked and stored up in artificial reservoirs, is repidly carried off by these streams. these streame.

4. The prevniling tenure in the district is bhacli, or a system of produce reuts. Some 70 to 75 per cent. of the caltivation is held under this system. About 25 per cent. pays cash rente. The systems are not localized, or confined to partionlar tracts. Certain orops, however, are nearly always cultivated under the bhacli system, each as rice; and careful crops, each as pagent and careful crops, each as pagent and careful crops. always cultivated under the bhaoli ayatem, each as rice; and cortain crops, such as poppy and sugarcane, are invariably cultivated at each rents. But the two ayatems exist side by side all over the district. In consequence of the bhaoli system and the general ignorance of the cultivating class, the tenants are markedly sub-crivent to their landlords, and in many cases completely so. The result is that in most cases the rayats depend emirely for works of irrigation upon their landlords. Individually they have not the capital to undertake such works as the conditions of the district require; nor have they acquired sufficient self-reliance to unite among themselves for the purpose of un-dertaking any works of general otility.

The permanent settlement is in force in this district.

5. (1) to (6). The statement marked "B" shows the number of leans ander the Land Insprovement Leans Act granted during each of the past five years and the nine months of the current year. Leans are taken by the people for improving or extending the means of irrigation with fair readlness. But I am of opinion that the system of making advances under the Land Improvement and Agriculturists' Leans Acts might be considerably improved in more ways than one, and further extended in the districts of Bihar. The chief drawbacks to the existing system, which, so far as I am aware, are felt by the land-owners and raysts, are—firstly, that the leans cannot generally be given at the very time they are wanted; and, secondly, that the procedure in force permits of persons applying for leans having to pay fees to clerks and others, in order to smooth the way as they think for sametion to, and actual payment of, the amount. A system should be introduced by which sanction to the grant of advances could he more promptly given and the cash paid personally by a gazetted efficer at convenient ceatres. 5. (1) to (6). The statement marked " B " shows the numconvenient ceatres.

6. I have not found this to be se.

(a) Tide above.

(b) Seeing the great improvement effected by the Sone Canal system in the comparatively small truct served by it in this district, the more culightened classes are fully alive to the value of extended irrigation, and would welcome further extension.

#### B .- CINALS OF CONTINUOUS FLOW.

7. The only canal of continuous flow in this district is the Patna Gya Canal (Baron to Khaganl), running almost parallel to the western boundary of the Gya District. The tract served by this canal grows the ordinary crops (bhadei, winter rice and rabi).

(1) To a small extent.

(2) To a great extent. Sagarcane, petatee and poppy which could not otherwise have been grown are new grown in substitution of the ordinary food-grain crops.

(a) 15 per cent. (b) 50 per cent. (c) 75 per cent. oa srea actually irrigated.

8. I would say Rs. 10 to Rs. 15 in case (1) and Rs. 20 to Rs. 25 ia case (2).

9. (1) Rs. 3 per acre on the area actually irrigated.

(2) The custom different and interest anniharis. In the case of nakd lands an occupancy rayat pays the entire water-rate, but pays nothing extra to the malike. In the case of non-occupancy rayats it depends on the zamindar how much he takes. It depends also on the land and crop. In the case of bhacli lands the produce is divided half and half, or in such other proportion as may he customary. In bhacli lands the duty of paying the water-rate falls pri-

marily upon the tonact. Usually he prevails on his malik to pay half, or such propertion as the malik receives of the produce, but sometimes the malik decimes to pay any share.

(8) Nothing.

.. On the area actually irrigated in each case.

10. The expenditure on construction of village channels is generally incurred by land-owners, but occasionally by tenants when the land is held ander occupancy lights. The tenants have no security for recomposet—at least none is known.

11. No deterioration to the soil, or damage to people has resulted so far. The canal serves but n comparatively small tract in this district. It has rendered fortile a most unfertile tract, a large part of which was sandy and unproductive.

#### C .- CANALS OF INTERMITTENT PLOW.

[N.R.—Small treigation channels, supplied by tomporary dams throwo across a river-bod, are included under this heading.]

Under this category the pains or artificial water channels contomary in this district are considered, and the answers given below refer to these pains.

12. (1) and (2). Pains are artificial channels leading from a river, and dug out as far as the water is intended to be taken. Their width, depth and length depend, of course, on the supply of water available. The general condition of the rivers in this district has been described in a paragraph 3 (6) above. These rivers are world to the rivers. condition of the rivers in this district has been described in paragraph 3 (5) above. These rivers are impid terrouts after heavy rain, becoming swellow in a few hours perhaps, and carrying with them quantities of hard white and yellow sand from the granitic hills of the Chola Nagpur plateau, and dwindling down usually by the month of October, to nurrow little streamlots that wind a tertuous course through their broad sandy bods. The greater part of the sub-soil has been deposited by diluviou from these bills, and those of similar geological formation that food the Sone river. This accounts for the large proportion of sand in the soil, and the large areas that are covered with pure sand. Owing to the slope of the country from south to north and the large number of streams that cross it from south to Owing to the slope of the country from south to north and the large number of streams that cross it from south to north, with their small tributaries from oilher side, the rain water is tapidly carried away across the district, or percolates into the beds of the streams, which are deeply filled with sand. To these conditions, coupled with the fact that at any time the rainfall is small, the district lying, like Shahahad, more or less between the area served by each of the monseons, and receiving the full benefit of neither, must be attributed the relative unproductioness of the soil, the large area anonthizated and the consequent thinger population in this district, as compared with others thinner population in this district, as compared with others in the division. The systems of pains or water channels and ahars, or artificial reservoirs, have been devised to ranke the most of, and to supplement, this scanty water-supply. Pains have been ent from all the larger stream; some large, with many distributaries; some small, with few or no distributaries. The largest pains that feed a number of distributaries and irrigate many thousands of neres are known as desicin pains, desicin meaning literally a pain known as design pains, dasian meaning iterally a pain that has ten branches. The main channels are known as pains, and the smaller channels taking off from them are called bhoklas, while the smallest channels that lead immediately into the fields are known as karha. The pains have been cut originally by the large land-cuners, without any headwork to check the flow of water. In some cases in consequence the pains with a rapid fall have deepened and widened their own beds till the main river had adopted them and changed ils general course, the old had being granthom and changed ils general course, the old bed being gra-daslly left on a higher level and becaming dry sooner, or even wholly forsaken except in the rains. This is a danger that should be provided against by legislation to enforce the provision of headworks. The entrance to a pain is always out some way up-stream, above the lands it is re-quired to irrigate, i.e., is taken off at a level higher than that of the lands to be served. During the rainy season, from July to Sentember, say, the wains are full and flow that of the lands to be served. During the rainy season, from July to September, say, the pains are full and flow well; but as the rains cease and the rivers dry up, the water from the bed'lins to be led into the pain by means of training works known as derhiain or haluain. In a year of seasty rainfall, ar when the full has been untimely, these pains are of event importance for the rice erap and the sowing of the rabi. Last year (1801) was such a year. There was hardly any minfall after August, and the Hathi Natshatra, the meet critical partial for the padly crop. Makshatra, the most critical period for the paddy crop, whoa the cars are forming, passed by without a drop of rain. A sudden activity was immediately seen in all the rivers, training works were vigorously pushed on at the heads of

the pains to try and lead into them every drop of water Mr. C. E. A. that was still left in their bods. The more wealthy land- W. Oldham. lords caused bunds to be erooted coress the river-bods at oustomary places, to block up what water there was, 24 Oct. 02. and thus to give it a head into some pain.

when the level of the country permits, the water is led into the field from the pains and bhoklas by menns of the little channels called karkas already mentioned; where the level of the water in the pain or bhokla is below that of the fields on either side, the water is raised by some of the artificial means in use in this part of the country. The three commonest methods in this district are the lathkunri (lever and buokst), chanr or sair (water basket) and karin (wooden cance-shaped lift). In the case of all the important pains that feed many villages, each village has its fixed turn of so many days or hours to use the water. This distribution of the right of irrigation from these channels by tures is known as parabandi. There is in this district a celebrated register of the distribution in the case of the principal pains, known as the fall Bahi, prepared by the former eveners of the Tikari-Raj, the largest private estate in Gyn. The enties in this book are still accepted as evidence of the rights of the villages specified therein. Frequently one village tries to take more water than it should; or size, when the rainfull is scarce, villages lower down the pains seek to get water before their turn, lost there he no water left whee it comes to their turn; and the disputes often terminate in blows and occasionally in bloodshed. Quarrels are also common in regard to the crection of bunds or garandis across the pains or bhoklas to steel or divert the water. Considering the vist system of these channels in the district and the fact that they are all under the private central of the zamindars and villagers, and considering the vital imperature of water in years of unfavourable rain, it is surprising how comparatively few cases cad seriously.

All the large and important pains in this district were constructed long ugo. I am not aware of any large pain having been newly constructed in recent times. The inception of such a work must come from a single opitalist landholder, who has the means to carry it out, and the incentive tode so, that is to say, whose personal interest it is; are else from two or more combined in interest, who are similarly circumstanced. And here we come to the difficulty that stands in the way of any such private onlerprise on a large scale at the present day. The gradual disintegration of property, the parcellement of rights which is encouraged by our own legislation, is the cause of this difficulty. Where formerly there was one land-holder supreme in authority over a critain large area, there are now perhaps fifty petty hard owners, whose interests conflict, or whose relations are so strained interest as to render combined action impossible.

The consequence of this change of things is unmifest in places from the neglect of existing pains. Only recently in a tract in which scarcity was apprehended the complete disropair of an important pain, that formerly served, it is said, some hundred manays, was brought to my notice. It is a pain which, if properly repaired, would save a large part of the tract in question from the possibility of famine; but when I endeavoured to persuale the local anniadars to take the work in hand, I famed that the proprietary rights in the land had been divided up to a remarkable extent since the pain was coostructed originally, and that the antagenlytic attitude of certain proprietars made it impossible for me to take any steps in the matter. The rapid sub-division of proprietary rights is patent to officers that have to administer the partition law. As this proceeds there is a teodency for these important works of irrigation to full into disrepair—works that are essential for the growth of the chief crops in this district, and without which a considerable perion of the endivated area would remain untilled. As it is, the greater part of the cultivating class, a large proportion of the tent population, have little to span after merting the necessities of life; and if these irrigation channels are not maintained, the present donsity of population exaant be kept up. It is probable, in my epiaion, that this question will at some future dute press upon the notice of Government and call for remedial measures. It will be well to consider it before such time. Unfortament could not undertake the cantrol and up-keep of the pains, or substitute a canal system without reouparting itself by levying a rate or cess; and a difficulty would lie in determining what propurtion of such cess or rate should be levied from the proprieters and what from the cultivature. If a system of canalisation from the smuller rivers is professionally declared to be impracticable, the pains will have to be maintained; and Government should, at all

Mr. C. E. A. events, so far exercise centrol that no pain should be with W. Oldham. out a musenry head-work to regulate the inflow, and prevent scenning out and rivers changing their courses and damage securing out and 24 Oct. 02, ing fortile fields.

- (3) The period for which the supply is ordioarily maintuined in sufficient quantity is—
  - (a) Four months, ie., from July to October.
  - (b) Three months, i.e., from July to Soptember.
  - (c) The period varies according to that during which the rivers are supplied. I have stready referred to the fitful flow of the rivers in this district. They may fill for a few days and be almost empty for the next fortnight, and then fill again with n day or two's rainfull, and so on. This is the reason why a system of canals of continuous flow is impracticable in this district; but it is no reason why a some measures should not be taken reason why some measures should not be taken by Government to make the most of the facilities that do exist, and at least control and regulate that construction and working of the pains, with-out nanccessarily interfering in the private rights involved.
- 13. (1) To a great extent. Bhadoi is the only crop in his district that can he depended on without some means for artificial irrightion.
- (2) To a very large extent, chiefly in rendering the cultivation of paddy and sugarcane possible, where it would otherwise not be.
  - (8) About-
    - (a) 10 per cent.
    - (b) 45 per cent.
    - (c) 70 per cent.
  - 14. About-
    - (1) 10 per cent.
    - (2) 30 per cent.
- (2) 30 per cent.

  15. No; not ordinarily, but frequently in the case of crops accessomed to well-irrigation. 12 or 13 per cent. of the total irrigation in this district is effected from wells. It has already been explained how water does not remain la the rivers for more than a few mentls, and the pains usually dry up before the end of the year. Irrigation thereafter must be entried on from ahars or wells. In ndry year the ahars also dry up by the end of the year, and from Junuary to June recourse must be had to wells, except when rain fells. The extent to which irrigation from pains is supplemented by irrigation from wells depends then chiefly upon the clurareter of the season. It may be stated as the general rule in an average year that in case of the crops requiring irrigation between January and June, wells must be reserted to. For instance, poppy and sugar-came cultivation and various kinds of market produce invariably require to be irrigated from wells in this district.

  16. (1) and (2) Fide answers to question 8 above, i.e., in
- 16. (1) and (2) Fide answers to question 6 above, i.e., in ease of continuous canals.
- It is difficult to form such an estimate: but the increase would, of course, he less than in the case of caush of coutinnous flow.
- 17. (1) No rate per acre is levied in the case of pain irrigation.
- (2) These pains are part and pacel originally of the bhadli system of tenare. Under this system the produce is divided between Inndlerd and tenant. The handlerd is supposed to maintain such works of Irrigation and to reap his recompense in the form of a larger an oant of produce as his share. I say the landlerd is supposed to maintain such works, because they do not always do so, or where they do, they do not always do it wholly at their own cost. They often make their tenants labour without charge, or else appropriate a larger share of the produce than they should according to the strict principles of the system. The ideal rule of the bhadli system is that the produce should be divided half-and-half between landlerd and tenants, and there are many officers who suppose that this is the general practice. As a matter of fact, however, division by half is very rare. The landloid generally takes nine-sixteenths of the produce and often ten-sixteenths. In explanation of of the produce and often ten-sixt enths. In explanation of this apparently unfair distribution, they plead that they maintain the unrigation works in good order and better than other landlords who take a smaller share of the than a laft share of the produce, e.g., when jungle or waste land has to be brought under enlitration, or in special cases when the cultivation requires unusual labour on the

part of the tenant; but these cases are infrequent, and the part of the tenant; but these cases are infrequent, and the ordinary practice, excepting only cultivation under special circumstances, undoubtedly is to take considerably more than half. It will readily he observed that this is nothing less than the exaction of an increased rate of reat on account of maintaining the works of Irrigation, which the advocates of this nationated system of tenure would assert to be the inherent duty of the landlerd, and the ready performance of which duty by the landlerd, and the ready performance of which duty by the landlerd, is regarded by superficial observers and by admirers of the blacki system as its greatest charm had us conclusive ovidence of the excellence of the system.

As the amount of extra demand levied in this way depends, firstly, upon the character of the zumindar, and, secondly, upon the price-current of the particular kind of produce at the time, it is not possible to state an approximate rate that would be generally applicable.

- (8) and (4) Nothing is paid in such forms to Governmoat by the owners.
- 18. Excluding the initial cost of digging the pains which, I take it, is not referred to here, there is the cost of np-keep and the cost of labour employed in leading the water into the fields from the channels. Uning to the generally sandy nature of the river-heds, the pains become silted up quickly and have to be cleared out every year or two. Considerable and have to be cleared out every year or two. Considerable oxpenss is incurred in this process—expense which primarily fails upon the landlords, but all ordinary electance of channels is done by the cultirators themselves by what is known

The cost incurred by the tenants in leading the water to the fields is small, this work being usually done by the cultivators themselves.

19. I have observed no damage o used by Irrigation itrelf in this district. But damage has been ludirectly caused
his some places by rivers changing their courses owing to
the execution of pains. In this way I have seen the lands
of soveral villages covered with sand and rendered uncultivable. There can be no doubt, too, that the net-work
of pains in the district must carry quantities of sand alout,
and eventually increase the proportion of sand in the soil.

There is no water-logging in this district, as the slope from south to not his rapid. A consequence of this slope is that there is no need of raising high banks to the pains, the level of the water being generally below the ground level on each bank. The pains, 100, are nearly always out along the natural lines of drainage.

the natural lines of drainage.

20. These pains are constructed and maintoined by the landlerds with the reservation I have already noted in paragraph 18 above. Ordinary pelty maintenance, such as clearance of silt, repains of small breaches, etc., is done under the goam assem. At the order of the landlerd or his local agent or servant, the cultivators have to supply one man per plough to turn out on these occasions to earry out such work. They generally turn out in a body at such times, and this is known as goam.

The,npproximate annual cost per nere cannot he ascertained with any approach to acouracy.

The system of pains, as it exists in this district, is indispensable for great part of the cultivation, and it works fairly well. As I have already stated, the bhaoli system of tenure is intimately connected with this system of irrigation. Both are the result of the physical conditions of the district, and they are largely inter-dependent. If the bhaoli system were abolished, these pains would fall into disrepair. The cultivators could not, or would not, combine of their own accord to keep them up. The greatest drawback to these systems is that the control of the irrigation works gives themendous power to the landlords over their tenants. They place the tenanty in more or less complete subjection to the themendous power to the landlords over their transts. They place the tenantry in more or his complete subjection to the landlord, who can, and very often does, extort most unfair terms from his tenants. This system of irrigation festers, as it were, the bhaoti system of tenare, which is an anachronism, and is the canee in great measure of the serf-like status of so many of the tenantry in this district. In my opinion legislation is required and will eventually have to be faced. The following are the two most important directions in which action is at present regoired:—

(1) The provision of a masonry head-work in every pain to control the level at the entrance and regulate the inflow. I have already referred to the damage that has been laused by pains seeming out at the head, depening and widening its channel, and thus leading ultimately to a change in the course of a river. Busides this danger, there is the injustice often caused by

one pain taking off higher up a river, appropriating all the water in the river. It has been a long existing practice, two, in places to construct bunds right across the river to drive the water into a pain, and thus deprive lands further down stream of all supply.

(2) The enforcement of the up-keep of existing pains in bhaoli tracts. The liability of pains to be come neglected owing to the sub-division of proprietary rights has already been noticed. In this way a very heavy and unjust loss is caused to the cultivators by the neglect of quarrelling shareholders; and measures are necessary to protect the cultivators in such cases. Power should be given to the local officer to intervene in case of neglect and lovy the cost from the proprietors.

It will be a question, it my opinion, at some fature time, whother Government should not assume the entire management of the pains or undertake a system of canalisation on their lines, in which case division of produce by half and half exactly between landlerd and tenant woold have to be enforced, or elso cash runts introduced, and the water-rate would be levied equally from landlerd and tenant. This, however, is not urgontly required; but the two measures stated above are very necessary.

- 21. (a) Paine are essentially private canals. The persons entitled to use the water of pains have paras, or turns, assigned by mutual agreement or ancient coastom, and disputes both in the Criminal and Civil Courts constantly occur in this connection.
  - (b) Government has not done so hitherto.
- 22. Yes, if legislation were effected on the lices indicated in my answers to question 20 above, I think it would be most desirable to encourage and assist in the construction of pains by private persons. This might be done by granting liberal advances for specific and professionally approved works of this nature.

# D.-TANKS.

23 (1) and (2). Tanks are seldem used for irrigation in this district, but ahars will come under this category. An char is an artificial catchment basin formed by blocking a small drainage rivulet, and thus backing up the water. These calchment basins are nearly always of a more or less rectangular shape, embaukmeats being raised on three sides of the rectangle, the fourth side being left open for the drainage water to enter. Owing to the slope of the land, the highest embankment is usually on the north, and this embaukment generally runs east and west. From each end of this embankment, other embankments project southwards, diminishing in height as they proceed according as the level of the ground rises. In this way a three-sided catchment basin is formed, deepest at the northern side where there is always some arrangement, at the spot where there is always some arrangement, at the spot where the drainage of the catchment area would naturally issue if there were no embankments, to let out the water from the ahar for purposes of freigation; and if the ahar is built on a drainage vivulet, and thus receives the drainage of larger area than its own, there is a spill or weir to pass off surpins water, which may perhaps flow on to matcher akar further morth. These outlets and spills, or wers, are formed in various shapes and known by various names. In small ahars, where the quantity of weter banked up is not great, it is generally sufficient to cut a narrow passage through the earthen bank at the deepest spot to draw off the water as required. If the mass of water be greater, a half pipe formed cut of the trunk of n palm tree and known as adhangs is let into the bank to protect it from excessive crosion. If the ahar is n very big one, a masenry outlet is often built into the bank to protect it from excessive crosion. If the ahar is n very big one, a masenry outlet is often built into the bank to protect it from excessive or chanka or chanka. The weirs or spills to pass off surplus water are made of brick or stone mas

level through which it flows to the field where it is required. Mr. C. E. A. If the water in the ahar be low and does not reach the W. Oldham. bank, a depression (kandari) is dug by the side of the bank, and a small channel cut from the deep part of the 24 Oct. 02.

ahar, leading into this depression. Sometimes when the level of the water is very low, it is necessary to employ a sories of two or even three lifts to raise the water to the level required. The prime value of these catchment reservoirs is that they store up water that would otherwise be carried away by the naturally rapid drainage of the country. The rainfall in this district is so small, and so uncertain as well, that the cultivators cannot depend upon it. It is quite insufficient, in fact, to maintain cultivation all the year round. If it were not for those ahars, there would be no water on the higher lands (where pains are not practicable) available for purposes of irrigation after the month of September. They are ladispensable on the higher tracts that lie between the river-basha, firstly, for irrigating the paddy as it grows up, and, secondly, for the sawlag and germination of all the rabi crops. I give this description of ahar irrigation at some length, as it is specially provalent in this district; at the present time almost half the irrigation carried on in this district is offected by the ahar system; ond as I find it has previously been inaccurately described, or confounded with the system of genrabands, which is a different thing, or else connected with pain irrigation from which it is quite di-tinet. A pain may eventually, after it has almost spent itself, lead into an ahar, but such cases are rare, and pain irrigation is not possible on the highest lands for which the ahar system has specially been devised.

Irrigation from tanks, which are comparatively few, is carried out in much the same manner.

- (3) (a) Four to six months, July to December.
  - (b) Four mouths, July to October.
  - (c) Dependent on rainfall.
- (4) Depends on the size of the ahar or tank. The largest in this district must irrigate about 1,000 acres.
- 24. (1) to (3) To n much less degree than in the case of canals of continuous or intermittent flow.
  - 25. About-
    - (1) 10 per cont.
    - (2) 30 per cent.
  - 26. Fide answer to question 15 above.
- 27. See answer to questions 3 and 16 abovo. The increase is less in the case of ahars and tanks, and specially in the case of tanks, where the difficulty of lifting out the water is considerable.
  - 28. (1) to (3) Nil.
- 20. This is done by the tenant himself. The actual cost cannot be stated. He has no scenarity for recoupment.
- 30. Vide answers to question 20 nbove. In the case of ahars small repairs are done by the tenants, large repairs by the hadded. I would say 4 names to 8 annas per aere irrigated should be spent annually to keep an ahar in good repair. The amount, however, depends largely on local conditions, nature of soil, etc.

Tanks are falling into descetude in this district and are not maintained in repair.

- 31. I know of no such case.
- 32. Yes, by advances to laudlords for specific approved works.
- 33. Inconvenience is felt. See answer 80 above. Tanks are not kept in repair at all, I regret to say, in this district. They have been largely superseded, however, by the abars which are found to be much more convenient for purposes of irrigation. Abars are usually constructed on high lands where the clay is comparatively hard and little silt accumulates. Abars are generally kept in good repair. This is done by digging a layer of soil from the interior of the abar, and heaping the soil on the banks where required.

# E-Wells.

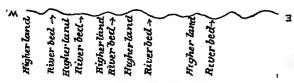
31. As far as wells are concerned, the surface configuration of the district need only be considered. There is the hilly country all along the southern side of the district, and Mr. C. E. A. the easy slopes and plaine of the rest. A section from W. Oldham. north to south would be semething like this:—

24 Oct. 02.

SP. No, not in this district, where irrigation by welle on any extensive ocalo is not practicable. The efforts of Government would be better devoted otherwise.



Again, the district is crossed from south to north by numerous rivers, the beds of which and adjacent lends are low, the land between each river basin is relead. Thus a section from east to west would be something like this:— 40: Temporary wells ore commonly used in this district in tracts where the soil is sandy, or a long water-conrec. They afford considerable protection to the poppy which is largely grown in this district, and in a less degree to other dry crops.



(1) The average depth of a permonent woll in the lewer tracts or near the rivers is from 15 to 25 feet, but on the higher tracts it vories from 85 to 40 feet.

(2) (a) and (b) The snpply is chiefly from percolation, but occasionelly from springs. A well with a good spring will never fail, but a well served by percolation only is liable to fail in dry years and in ordinary years in the hottest months, if not cleared ont.

. (3) The cost varies with the dopth and diameter of a well. The overage cost of a good mesonry well of, say, 42 feet diameter will be perhaps Rs. 300.

(4) A good masonry well would last 200 years, but it built of bricks set in mud, it will not last more than 25 years.

(5) With the lath-kunri (lever and bucket). The mot is raroly used here.

- (6) About 5 ocree.
- (7) About 5 cores.

35. (1) Vide answere to questions 7 (1) to 7 (3) (c), 13 and 24.

(2) Land irrigated by wells is usually deficila in this district. Well-irrigation is almost wholly confined to the immediate vicinity of the villages, where poppy, merket, garden produce, marua, barloy and ench like crops are grown, and where the produce is much better and more valuable then in the lands further from the village irrigated by pains and ahars. Well-irrigation is hardly ever resorted to in the case of the kharif, or the larger portion of the rabi crop. Perhaps 9 per cent. of the wells in the district are on the dihans lends, or lands immediately adjoining the village.

36. The lands commanded by wells in this district ero the higher lands around the villogs. This method of irrigation has always been adopted on such lands, end no comparison with other conditions is practicable.

- (1) 50 per cent.
- (2) 500 per cent.
- 37. (1) and (2) No such rate is paid.
- 37. (II) Vide supra.

38. (1) Frequently in this district rock is met when sxcavating o well. The custom is to dig tentotively before embsrking on a masonry project.

(2) Not very often, but in several parts of the district in mell areas the cley is unsuitable for well-digging, es it folls in at coce. Such clay is locally known as kachua mitti, from kachua, a turtle, either because these animole are enposed to hurrow in the earth, and thus cause the sides of the well to fall in, or because the clay resembles the puddle-like clay ejected by the turtles when they burrow.

38. (II) The result of an experiment once made in boring is given in Appendix C attached. No assistance has been offered to, or sought for, by any private individual to my knowledge. I think the people know best what suite them.

40. (II) I would only take measures in this direction in a year of drought, and would give advances widely for their construction. Their cost is bat Rs. 4 or Rs. 5 on the average.

## Appen dices.

A.

Table showing the monthly average rainfall recorded at the undermentioned stations.

Name of month.	Sadar Sub- division.	Sap-	Aurang- ahad Sub- division.	abad Sub-
1	2	8	4	5
Jannary Febroary Maroh April May June July August September Octobor November December	0-58 0-67 0-43 0-26 1-83 6-56 13-10 12-50 6-89 2-21 0-38 0-18	0.66 0.61 0.50 0.23 1.76 6.28 11.71 11.50 6.43 -2.87 0.16 0.17	0.60 0.47 0.43 0.19 1.38 5.49 12.75 13.43 6.80 2.27 0.25 0.25	0.70 0.56 0.37 0.15 1.46 5.64 12.60 12.60 5.87 2.54 0.27 0.18
Total .	45.09	42.88	44:31	42:89

В.

Statement showing the number of land improvement loans granted during the past five years and the nine months of the current year (1901-1902).

Sob- division.	1896-97.	1887-98.	1898-99.	1899-1900.	1800-1801.	1901-1903 to date.
Sader . An:angahad . Nawada	81 24 2	Nil Nil 1	18 Nil Nil	48 1 Nil	41 A Nil	11 23 1
Total .	107	1	18	49	45	35

C.

Extract, paragraph 92, of the Land Revenue Administration Report, Bengal, for the year 1892-1893.

92. Tube-wells.—The Collector of Gya reports that a tube-well was sunk in the Gorments, implements, machiners, steps, steps.

a depth of 44 feet in a sub-coll of stiff yellow clay. The experiment seemed to show that in a stiff clay soil a tube-well is useless, and that a 25 feet

limit under a simple draw-pump is also usedess for the Gya District, since in the hot weather numbers of these wells ore dry to a depth of 40 feet. The experiment was made in March in a locality where the weter was at the time aheat 15 feet below the surface. In the hot seeson the water here falls to 30 feet. The Collector proposes to here through a further depth of 30 feet (apparently to a depth of 60 feet altogether) in the hope of tapping a spring. He reports two notoworthy snecesses in the use of tube-wells in the Gya District. One of them relates to the well supplying the locomotives in the railway stetion. The depth of that well is considerable, but the Collector does not know the exact dimensions. The well ran dry in

the hot weather. A 6-lock pipe was driven through the Mr. C. E. A. bettom to a depth of 20 feet helow. Water was obtained W. Oldkamand has never failed since. The cost was trifling. The other relates to the Jubilee well in Tikari; it was sonk to a depth of 40 feet, when all hope of success seemed to be at a sonk of a seement of the cost was seemed to be at the c way. A smoller well was thou driven down in the centre to a further donth of 20 feet. The weter rose 40 feet in a night, and has stood at that height (roughly 20 feet from the serioce lover since. The results are important as showing the possibility of obtaining water for irrigating sugareane in the Gya District in May in the hottest seeson when the ordinary wells ran dry.

II.

#### Memorandum.

No. 1538-G., dated Gyn, the 23rd October 1902.

From-C. E. A. W. OLDHAN, Esq., C. S., Collector of Gya,

-The Commissioner, Patna Division, Bankipur.

In roply to your letter No. 5174-G., dated 26th nltimo. in roply to your letter No. 01/4-Cs, taken 20th altimo, io regard to the question of the expediency of legislating with a view to give Government control over the fighting for water which now takes place and whether any of the major private irrigation works should now he taken ever by Government, I have the header to subject the annoved copy of the opinion given by the Executive Engineer, Eastern Sone Division. It will be seen that Mr. Brenner does not consider that Government should setually control the distribution of water from ahars and pains, but he is of opinion that it might be possible to establish a record-of-rights for each river, pain and ahar; and laudlords should be compelled by law to keep all their weirs, pains and ahars in good order, to provide head sluices to pains, and massory escapes and outlets to all large ahars.

- 2. I am strongly of opinion that some legislation will have to be taken, as I have already stated in my answers to the first series of questions issued by the Irrigation Commission (vide answer to question 20). I have forther considered the sobject since and have consolted many landships and others and consider that the District Officer considered the sobject since and have consolted many land-holders and others and consider that the District Officer should be empowered by law to enforce the maintenance in good repair of all pains and ahars used for irrigation, and in case of default to be empowered to have the necessary repair carried out under his own orders, and to lovy the cost there-of from the landlord or landlords concerned in proportion to the extent of their interests. I am not of opinion that such control as I would propose would prevent fighting over water. Soch disputes take place even in causal irrigated areas, though to a smell extent no doubt.
- 3. In order to keep up the irrigation works and with a 3. In order to keep up the irrigation works and with a view to the distribution of water according to the recognized turns or rights, a man might be retained in cash village, to be paid by a cosa from the villagers themselves, whose special doty it would be to look after these works and give each cultivator his water in due turn. The District Officer should be empowered to appoint such a village servant in any case in which he found sufficient reason, in consequence either of the occorrence of frequent disputes, or the large extent of irrigation, or for other reason. In case this man's remuneration whether in cash or kind were not paid by the village, the District Officer should have power to enforce its payment. At first such appointments might be made only payment. At first such appointments might be made only in the case of the more important pains and akars in which many proprietors have separate interests, and the result of the experiment awaited. It is no use, however, hoping that

by the assamption of Government control, fighting about water will be prevented. Such disputes will always occur in years of drought.

- 4. I have suggested above that servants of the villages should be appointed, as this system is calculated to work much more smoothly than the appointment of direct servants of Government, who would be a source of much greater harassment and expense to the people.
- 5. I here already stated in my answers to the questions put by the Irrigation Commission that proprietors should be compelled by law to make masory head works for every pain. I am also of opicion that they should be compelled to moke masorry outlets in all chars where the District Officer may consider it necessary.

Dated Baroon, the 19th October 1902.

From-The Executive Engineer, Eastern Sone Divi-3100,

To-The Magistrate and Collector, Gya.

With rescroves to your andorsement No. 1424-G. of 27th ultima on letter No. 5174-G, dated 26th idem, from the Officiating Commissioner, Pratna Division, I have the honour to report that I do not consider that it would be advisable for Government to interfere with the octual distribution of water from ahars and pains. The supply of water is not sufficient for all in years of scanty rainfall and if the distribution was taken a way by Government and in the distribution was taken and pains. bution were taken over by Government, cultivators would quickly forgot their previous troubles and attribute all the damage done by want of water to mi-management. A large establishment of subordinates with attendant ovils would be wanted to sopervise the distribution, and I am certain that the cultivator would not really be much better off than at present as the cost would be heavy.

It might be possible to establish a record-of-rights for each Nuddi, pain or akar. If this could be done, I think there would be less fighting over water, as the parties would at least know for certoin which side was in the right.

2. With regard to the proposal that some of the major works should be taken over by Government, I am also of epinion that this would not be advisable. I think that the laudlords should be compelled by law to keep all their weirs, pains and ahars in good order, to provide head sleices to pains, and masoury escapes and outlets to all large ahars.

Boyond this I would not recommend Government inter-ference in the management. The cost to the coltivator would, in my opinion, more than counterbalance the advant-age he would denve.

- 1. Q. (The President.)—How long have you been Collector of Gya?—For nearly five years.
- .2. Q. Before that were you in this part of the world ?— Yes, I have served in Shahabad, in Darbhanga and In Monghyr olso.
- 3. Q. And you have probably had some experience of famine?—Very slight. In 1892 in the Monghyr District I was in charge of a small famine relief circle. The distross was not sovere.
- 1. Q. Would you say that there was any place in your district where there is a reasonable fear of famine, or are you practicelly immune?—I don't think we are immune, but we are almost immune at present. There are one or two tracts in the district in which I think famine might coent.
- 5. Q. And what is the characteristic of these districts ? 6. Q. And what is the characteristic or these districts? Is it an absence of pains or ahars, or is there may deficiency of rainfall?—The normal rainfall is low in cordistrict as it is in the Shahabad District. Secondly, the means of irrigation is these truets are few and unreliable; the lands are high; the soil is not very productive; and if a good rainfall does not occur, the reservoirs and artificial channels for irrigation are not filled, and consequently the cross suffer. crops suffer.
- 6. Q. What would be the remedy for this ?—The only remedy is the extension of the system of artificial irrigation by channels, reservoirs and wells.
- 7. Q. The extension of channels and reservoirs has pro-bably its limits; has it not ! Has all been done that can be done?—I think not in the case of channels, and in the case

Mr. C.E. A. of reservoirs also, I think, there is room for extension and W. Oldham. improvement.

8. Q. These channols; ore they derived from the etreams
21 Oct. 02. coming from the Gya hills?—From the hills of ChotaNagpar which fringe the Gya District.

- 9. Q. And which are torrential?—Quite so, with the exception of two or three etreams which are more or less percunial. The Punpau generally has water all the year round, though it has very little in the hot weather; nod there are two other small streams which retoin their water.
- 10. Q. The Poon Poon passes through Patna also?—It does. It is a small river, but still it retains water, owing to the soil through which it flows.
- 11. Q These ahars and channels are very ancient, I suppose?—They are, no doubt.
- 12. Q. They are entirely of native making. They have not heen suggested by us?—Not at all. By far the greater part of thom data from before the British rale. The tendensy aow is for these channels to foll into disrepair owing to the disintegration of proprietary rights. Formerly when these channels were made they were made by the order of large esminders who owned large cototes and hod large powers—powers which no examinder at the pre-ent day wields or can possibly wield under our laws. For instance, the Mnharaja of Tikari was all powerful in the district one hundred and fifty yeers ago, and in the time of previous Mabarajos, who had similar authority, the greater portios of these channels were made, though we have no historical records of this. Now it is impossible for such new channels of the description to be made by any zamindar, hecause hs will have to carry them through the lands of other zamindore who will not agree, or who will obstract in some way or another.
- 13. Q. Then that state of things is at least partly due to this outfortmate want of cohesion among them in recognising common objects?—It is the state of society at present. It is a lamentable condition of things as doubt, batit is n fact that no two neighbouring ramindars will combine together to help in a work of common benefit.
- 14. Q. And that the zamindars is this great sub-division of land are not as large zamindars as there were formerly?—Not rearly. This disintegration is going on daily. It is admitted by all.
- 16. Q. What is the remedy ?—Disjutegration we cannot prevent. The only device for getting round the difficulty is legislation.
- 16. Q. Legislation is the direction of msking the authority of the Collector mere capreme?—Of enforcing the up-keep of these chonnels on which the caltivation of the soil or of % the of the soil of the district depends, mantaising them, repairing them and extending them have the necessary. Without legislotion this cannot be done. It is improceitable at present. I know many cases of pains which bave fallon into disrepair owing to these casees and which have either become unused or partly unused, or so largely cilted up that they are rendered less corviceable than they used to be.
- 17. Q. And would you give the Oellector summary powers to levy n fine in order to get the work done or force the men to eerry it out?—I would give the Collector seek power as this that he should be in a position to say to cortain zamindars who own the lands through which these channels pass, "repair them," and if they did not carry out his iostructions, he should be empowered by law to bove the work carried out himself and to realise the cost from these zamindors in proportion to their interests.
- 18 Q. Do you think the effect of such a law being passed would be to put them on their mettle. If not, it would give the Collector a great deal to do F—I think it would have that effect also.
- 19. Q. Do these works reolly require some professional advice to menage them ?—They do is their inception. That is another point ou which legislation is required. No new pain should be constructed nuless it be approved by come professional mao.
- 20. Q. I gother it would not he very easy to construct a new pain without interfering with the rights of some other zamindars?—It would be difficult. Objection would no doubt be raised by the zamindars having riparian interests further down. They would perhaps go into the Civil Court for an injunction or for damages.
- 21. Q. (Sir Thomas Higham)—Can they get an injanetion to prevent them?—I think so. Certaioly. The Civil Court has full powers to interfere in such matters.

- 22. Q. They can prevent a pain being constructed?—They can issue an injunction.
- 23. Q. Then the coss goes up to the High Coart?-
- 24. Q. These pains are little channels leading ont of nullahs, I suppose ?— Leading from the rivers.
  - 25. Big and little ?-Yes.
- 26. Q. Does the ramindar put a bund partially asross the nullah?—It is not necessary at all. (The witness illustrated his meaning to the Commission.)
- 27. Q. Is the zamindar allowed to pat a bund across a pain, or partiolly across it P—Iu many sases they have acquired what is called a prescriptive right to do so; but if any zamindar were now to bund up a pain, where it has not heen the custom to make a bund hitherto, the other proprietors would at once go into Court and get it hroken down.
- 28. Q. (Mr. Mair-Mackenzie.)—And do they, as n matter of fact, over attempt to do that?—Very rarely. Occasionally they do. Only the wealthy zamiudars are able to rick it.
- 29. Q. (The President)—Theu I suppose the ahar does double duty in irrigating the hade and having its own bed irrigated? Is that so?—It is, Sir. An ahar fills in July, and August and part of September. It is then easy to irrigate paddy and othe crops, and as soon as the water is all used up, rabi crops are grown in the bed of the ahar.
- 30. Q. And to which is the greatest importance attached—to the raddy or the crops grown in the hed?—Poddy as far as my experience goes. No doubt a very excellent rabi crop is produced in the soil of the hed, but it is a very small one.
- 31. Q. Are wells kept ap in the neighbourhood of these chars?—I bave not noticed that in the Gya District.
- 32. Q. (Mr. Muir-Mackenzie.)—You don't find that people choose sites for their wells be preference in their neighbourhood P—No. Abore are generally made at a distance from the villages.
- 3S. Q. And the wells are generally close to the village?
  —In my district, Gyn, wells are only generally used in proximity to the villages—in what is known as the dihans.
  Well irrigation catalde village lends is very rare.
- 34. Q. (The President.)—Do you know whother nny applications are made for advances to have ahars, pains or wells?—Ostensibly for this purpose there are numerous applications, but the greater part of the monoy is spent otherwise in sach cases.
- 35. Q. Is there may system of takavi advances for wells?—There is no special system for wells.
- 36. Q. In your district does irrigation by wells occupy an important place?—No. Pains and ahars are far and away ahead. I calcalated that about half the cultivated area in the district is irrigated from ahars and tanks. Tanks are very few in the Gya District, but nearly half, if not quite half, of the whols cultivated area of the district is irrigated from these ahars and tanks.
- 37. Q. And then how much irrigation is there from the pains?—I cannot exactly say.
- 38. Q. Aboat a quarter?—Qaito, perbaps n third. I would not be snre; I have not calculated this.
- S9. Q. Would there not be a feeling of confidence if you had a well for the ahar that in years of drought it would stand out better?—A well irrigates such a small area.
- 40. Q. Do you know how much it is in this part of the world?—A well will not irrigate more than 25 bighas hers. The average arso irrigated by wells is about 5 acres.
  - 41. Q. Is that all the year round ?-Yes.
- 42. Q. (Mr. Muir-Mackenzic.)—Does that mean n well of a single mot or more?—A well of one mot will irrigate about 5 acres.
- 43. Q. (The President.)—Do you think ony assistance is to be rendered to irrigation by a more liberal eystem of takavi advances?—I don't think it is a satisfactory system. I don't think it would be eatisfactory.
- 44. Q. And why, please?—Because these advances are, as a general role, not speat on those works for which they are osteosibly taken.
- 45. C. And can they not be looked after?—It is very difficult to ensore control, especially where you have got a large number of advances. It is impracticable in foct.
- 46. Q. Woold it be worth while to have a special officer or some one order the Collector for this parpose?—I don't think so. I would not advise it. I would depre-

sate any further special establishments. They are only u source of hurasyment.

- 47. Q. Do you think it would be a good thing te have a special officer going round the district giving taken advances?—I think that would be useful. Even in my district, I think, it would be useful to have a special officer going round and giving advances.
- 48. Q. (Sir Thomas Higham.)—What would it be spent upon f.—On the making of wells, repairs of ahars, cleaning out of channels, pains, etc.
- 49. Q. (Mr. Muir-Markonzic.)—I don't quite understand why you push the advances so much in Gya if you deprecate the extension of the system?—I den't deprecate the appointment of a special establishment.
  - 50. Q. (The President.) I see you say in your note that "a system should be introduced by which sanction to the grant of advances could be more promptly given and the cash paid personally by a greetted officer at convenient centres." You see no other practicable way of doing it or any botter way than this P—I think it is one of the means to the cold that we want to attain.
  - 51. Q. (Sir Thomas Higham) You speak of one canal that you have in continuous flow; that you call the Patna-Gya Canal?—Yee. That is one of the branches of the Sone system. It irrigates a comparatively small area in the Gya District.
  - 52. Q. and on the Sove Canal do they take the rents in slave of produce (bhaoli)?—In some parts, but the rents are generally cash in canal-irrigated areas.
  - 58. Q. Do you think, as regards the water-rates on the Sone Canal, more might be taken from the occupants ?—I think that the compensation from the canal Irrigation in the way of additional produce is more than what they pay for the water. More could be taken perhaps from them.
  - 54. Q. In the case of the non-occupancy tenants there is no limit to the power of the landlard to raise the rent. Is there?—There is a limit. He would have to go to Court, I think.
  - 55. Q. Can landlords enhance the cash rents on their non-secupancy tenants?—There are previolous of the law by which they can.
  - 56. Q. Have they risen in consequence of the mater advantages P-Yes, very largely.
  - 67. Q. Would not that point in the fact that occupiers' rates are not as high as they might be?—I will not say that they are increasing now on those lands which have reached their full degree of productiveness.
  - 68 Q. There is more competition in the way of applications for water now than there was formerly ?- Certainly.
  - 59. Q. So that if the rate was raised people would still come forward and want the water f-1 think they would.
  - 60. Q. You have very strong views as to the rates being too low f-I will not say they are too low.
  - 61. Q. You say that the cultivation in the district depends on the traks and abars?—Half the artificially irrigated cultivation.
    - 62. Q. That includes the point too?-No.
  - 63. Q. What proportion is dependent on the pains?— Mr. Mulr-Mackenzic also asked me that quostion. I am not in a position to say exactly, but I should say one-third roughly.
  - 64. Q. One-third of the artificial irrigation P-Yes. 56,000 acres use, I think, irrigated by the canals.
  - ob. Q. You say that one reason for proventing the construction of new pains is that the heldings have become very much smaller, and that the land-owners have much less power. Supposing that could be get over, would there not be an objection on the part of all the owners of existing pains to any new ones being constructed. Would it be possible to construct any more without interfering with casisting rights and pulvileges?—Yes, it would. There are some atreams from which no pains have been taken off at all as yot.
  - 66. Q. There are rome P.—Yes. There are some places, moreover, high up the streams where a pain might be taken off and no objection would be calsed.
  - 67. Q. Then there is room for the extension of paint if you get eyer this difficulty? There is room for still more important improvement in the way of repairs to, and maintenance of, existing pains.

- 68. Q. Because the present owners will not combine ?— Mr. C. E. A. Yes. W. Oldham.
- 69. Q. Does one pain irrigate many independent holdings?—A pain may irrigate a hundred or two hundred villages or mere; that is to say, a large pain would.
- 70. Q. And there is no way of sufereing the elegrances among a cha number. In there no power for management —no panchayat P—Nouc.
- The paneagy tr-Nous.

  71. Q. Then who is supposed to take the initiative?—
  The zamundars. It is their business. The system in Gya
  is the bhavisystem of rents which theoretically catalis
  upon the zamindar the duty of maintaining these works of
  irrigation. That has been the custom from time immemoriol. There is no law on the subject; some legal provision
  is required. The Collector cannot interfere at present,
  but he ought to be able to.
- 72. Q. When yoo have a number of zamindars, it simply depends upon their powers of co-operation?—Yes.
- 73 Q. Can any external influence be brought to bear upon them ? No legal influence.
- 74 Q. Only personal?-The days for that ure in fact departing too.
- 75. Q. For that you say you would require legislation; would you not?—Certainly. It cannot be done without legislation.
- 76. Q. To whom would you entrust the duty of sufercing their up-keep?—To the Collector.
  - 77. Q. Not the District Board ?- No.
- 78. Q. (Mr. Muir-Mackenzie.)- Why do you object to the District Board !- Because it is a Board.'
- 79. Q (Sir Thomas Higham.)—Do these ahars have an excess of water coming into them?—Occasionally.
- SO. Q Is that not a common trouble? Fairly common, but they ought to have, and nearly always have, an escape.
- SI. Q. Do that have an escape blg enough?—If it is not blg enough, of course the ahar may burst.
- 82. Q. Are they ever filled from the pains?-Yes, sometimes.
- 83. Q You may fill one and then the rains come down and it creffora? Yes, that is possible
- 81. Q. I suppose they belong to the same owners as the paine?—Sometimes
- 63. Q. Thoso is no question of paying for having them filled up f-No. Ahars, you will understand, are pre-eminently suited for the higher lands where rains cannot go. Pains, as you understand, can only follow the ralleys of the streams, but ahars are intended for the high lands—what are known as land lands in the Gya District where gains cannot reach.
- SO. Q. Is there room for making more of these ahara? -Yes.
- 87. Q. What do they want, money advances, or some-body to give them a lead ?—Money, enterprise, education.
- 83. Q. Do they make many new ones new ?- Newshars are occasionally made.
- 89. Q. You could not give any idea as to the numbers -No.
- 90. Q. I suppose you have never had famine in the Gya District, have you P—Wo are supposed to have had it in 1873-1874.
- 91. Q. Have you got any programme for works there? -Yes.
  - 92. Q. What wort of works -Roads, tanks.
- 93. Q. Irrigation tanks f .-- Tanks which would be need both for drinking and irrigation.
- 94 Q. Would it be possible to employ famine labour in clearing these pains out and parting them all to rights, or would that be objectionable, as being private property !—It might lead to disputes.
- 05. Q. Would the owners be able to employ labour in that way P—No doubt they would, but we would be doing work for private persons, not for the public.
- 16. Q. That is better than doing work which is useless?
  —We do not do work that is useless. Thaks are not useless, nor are rouds necless.
- 97. Q. You have plenty of useful works to employ your labour?—Certainly.
- PS. Q. You employ labour that you have on roads?— Yes, and tanks of which we are not likely to have a large number.

Mr. C. E. A. 99. Q. You propose to pot in masonry beads to these W. Oldham. pains?—I think that is a very organt necessity.

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  100. Q. Would there he any great objection on the part of the owners to that P—There would be some objection na doubt, bat it should be overruled. Great distress is being caosed by the non-existence of soch bead-works.
  - 101. Q. Would they welcome heads like that to prevent damage, or would they regard it as a means of reducing supply P—The latter. They would not welcome it.
  - 102. Q. Woold you propose to make them even if the objection exists?—I would give them the option of doing it, and if they did not, I woold have it carried out and recover the cost from them.
    - 103. Q. You would do it at their expense?-Yes.
  - 101. Q. (Mr. Muir-Mackenzie.)—With reference to land improvement loans during the last five years, I notice that the largest number was made in 1896-97—107. Can yen toll me the amonat?—No, but Rs. 1,04,000 was epent on irrigation works olene—wells, tanks, irrigation chennels and reservoirs.
    - 105. Q. Aboat a thousand rupees a loon?
    - 106. Q. (Mr. Allen).-Rs. 1,04,550 was spent.
  - 107. Q. Were the loans as large as that?—That was exceptionelly heavy.
  - 108. Q. Tako 1898-99?--There were 18 loans and Rs. 15,135 spect.
  - 109. Q. That again is nearly a theusand rupees a load To whom are they generally advanced?—There are two kinds of advances. Those figures represent only the Land Improvement Leaus Act. Advances are mode both to zamiodars and rayats, for imprevements to zamioders, under the Agriculturists' Loans Act to cultivotors; very rarely to coltivators under the Land Improvement Loans Act.
    - 110. Q. Is tenure any obstacle !-- No.
  - 111. Q. Theo why do you edvance so rarely ?- They take their leads under different Acts.
  - 112 Q. But if a roynt wants to make a woll, cannot be take it under the Laad Improvement Loans Act?—He can if he likes.
  - 113. Q. That bardly seems in accordance with the intentions?—No doubt, cattle, seed and other things are the objects. I do not recall any case of a reyat applying for a loan for a well.
  - 114. Q. Is that become he does not want it or because of the difficolties of getting it ?—I connot say.
  - 115. Q. Are there any difficulties on account of his tenure?—No, so long as the security is sufficient. If he has a large oultivation, he can get a correspondingly large loan.
  - 116. Q. And occopancy rights?—We do not make any bord and fest rule. Occasionly loans are given evoc to those with non-occupancy rights.
  - 117. Q. Is there any difficulty as to the availability of the security that the rayat one afford f—No. It means delay, but there is no great difficulty. There is delay on account of the inquiries to be made by the subordinates of the Revenue Department.
  - 118. Q Can that be obviated by any change of system?
    —If an officer were deputed to go into the district where it was thought advances might be required with fall powers from head-quarters to give leans up to a certain limit.
  - 119. Q. Havo no officers soch powero at present?—Officers in charge of Sab-divisions have these powers.
  - 120. Q. Do not they exercise them P—No, not in my experience. Applications for lance come into the head-quarters of the district ar sub-division.
  - 121. Q. And hond-quarters are often far distant from the applicant's chode?—It is not altogether the distance. The serious difficulty is the obstacles created among the maharrirs, and until the applicant gives 10 per ceet, to the men who deal with the loan, that loan is not given; some difficulty is raised.
  - 122. Q. Is no alteration needed in the period of re-payment of the load or lowering of the rote of interest?—I da not think it is necessary to lower the rate of interest; it is olresdy low.
  - 123 Q. What period of repayment is osually fixed?—Agricolturists' leans are usually repayable in three years.
  - 124. Q. And Improvements Loans?—It depends on the amount. Ten to fifteen years, very seldom fifteen years. The law allows op to twenty.

- 125. Q. I think the law allows repayment up to thirty years. The rules say tweety years, hot they often restrict the law oo this point. Woold you be prepared to go up to twenty years?—No, not beyond ten years.
- 126. Q. Why do you prefer the short period?—I think the men ore fully oble to pay within that period.
- 127. Q. If you allowed a langer period, woold you be oble to give leans to semewhat poorer cless of men?—We might, hot I do not think it is a matter of much import-
- 128. Q. Did yoo in the year of scarcity advance may considerable aum for the construction of kachcha wells?—No, it was not necessary. Last year was the only year of opprehended scarcity during my tenore of office.
- 129. Q. Have you over been canfronted with the difficulty that a scarrity that is offered is subject to a prior enoumbrance ?—Occasionally, not frequently.
- 130. Q. A witness soid that he considered that londlords might with advantage be given mere facilities to secure an enhancement of their rent, justifiable in consequence of improvements effected by them. Do you think that advisable?—I do not think any further facilities than are already provided by the Act need be given.
- 131. Q. He has to go to Court?—There are two ways—by coetract and by suit.
- 132. Q. If the matter is sobstantially beceficial to the teenet, he would have no difficulty in getting enhancement by contract?—Not if he is a good laadlord oud the tenant is reasonable.
- 133. Q. It would be dangerous to grant farther facilities?—I think it would be wrong in principle.
- 134. Q. Why, if the improvement is a good one?—I regard it as primarily the duty of the rayat to improve his land. It is chiefly the result of the peculiar system of the district which imposes that duty on the loodlord. I should like to see the abolition of the blacks tenuro in Gya, and nothing but each rents.
- 135. Q. Do not you think that the landlord has the edvantage of a good deal of capital which would otherwise lie, to a certain extent, idle P Could it not be usefully employed in improving the land!—It could be usefully employed in that way.
- in that way.

  136. Q. Another witness soid that if irrigation could be introduced into a district like the Bhabna Sub-division, that the people, including, I understand, the zamindars, would not object to the introduction of a general cess F—I do not agree with that opinion. I think they would strongly object. They would regard it as a violetion of the permanent settlement. Also the advantage would not be commonsurate with the cese levied.
- 187. Q. Da you think that, is spite of that objection, it would be justifiable to impose such a cess if Government were convinced that the adventages were commensurate?—I think it would.
- 138. Q. Do yoo think the advantage could be made commeosurate?—That is a matter for professional opinion.
- commonstrato?—That is a matter for protessianal opinian.

  139. Q. Supposing a tract very imperfectly provided with facilities for irrigation were by means of a protective work placed in as good a position as the Sono Canal area. Would that justify the cess?—Certainly. In my district, in consequence of irrigation, lands, which once paid annas 8 are paying Rs. 5 to Rs. 7 a bigha, and one zamiadar in particular teld me that a villaga which once brought him in only Rs. 8,000 naw brings him in Rs. 18,000. In such instances as that the imposement of a cess by Government would be instificible.
- 140. Q. Another sobject. Do pains occasionally lead into ahars?—It is not comman. Ahars are intended for high lands which cannot be irrigated by pains. Occasionally a pain is led into on ahar; then only for conserving.
- 141. Q. Can more water be stored by the construction of more chars far the purpose of receiving water from the paint?—Yes.
- 142. Q. With regard to disputes about the rights of water in different parts of ofreams, do you thick it would be advantageous to frame a record-of-rights?—It would be an excellent thing. It is a proposal that has been frequently made by me in conversation, but it has nover gone up to Government.
- 143. Q. Do I noderstand that you would enforce the payment for labour on pains by going to the Collector ta undertake the repair and to charge the cost provisionally to the zamindars? Woold it not be preferable to levy a cess

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and that Government should do the repairs?—I would rather give the zamindar the opportunity of doing it. If Government were to levy a gess, it would mean getting a permanent establishment for the work, and our experience of establishments is that they are a source of harusament. and annoyance to the people.

144. Q. There is no danger of the zamindara doing the repairs inefficiently !—If they did, the Collector should have it efficiently done. It would be for him to eee it officiently dono.

- 145. Q. He would require an establishment for that, I suppose?—Yes, it would require an increase in the sub-ordinate executive, but not a very large or unmanageable
  - 146. Q. Zamindars, in many cases, would not comply with the orders of Collectors?—Not, if they know that the Collectors have authority behind to enforce them.
- 147. Q. As for commutation of theoli lands, would you not fear that the people would dislike each rents?—They would welcome them.
- 148. Q. Do they not find that a produce rent serves them better, having reference to fluctuations of the seasons ?-In the case of some zaminderis, but not as a general rule.
- 149. Q. In the matter of pains, do you not think it a good thing that Government should take over the management of even some of the very large pains for irrigating a lundred villages for instance?—The experiment might be
- 150. Q. (Mr. Rajaraina Mudaliar.)—In the case of the zamindar whose revenue you said increased from Rs. 8,000 to Rs. 18,000 from the introduction of canal water does he pay a proportionate increase of the water rate?— That I cannot tell you. The rate is primarily poid by the cultivator, but the custom varies. In some cases the ramindar pays half; in some cases nothing.
- (Mr. Allen.)-In some cases the landlerd is allowed to collect from the tenants.
- 161. Q. What is your security from non-occupancy ton-ants?—His cultivation, his non-occupancy right. It is usual in such eases to grant a loan to a combined number of tenants, who are mutually responsible.
- 152. Q. Where an occupancy touant constructs a well at bis own expense, door the ramindar demand an anhanced slane of the produce or raise his money rent?—Where produce rents are in force, a certain proportion of the actual produce goes to the zamindar. So that if by constructing a well a rayat's fields produce a larger quantity the zamindar naturally gets the benefit.
- 153. Q. Does not that tend to deter the mynt from constructing wells?—So for as I know it does not.
- 154. Q. As to prior encumbrances, we get certificates from the registration officer for which no charge is made?— Wo don't get certificates.
- 155. Q. In other parts of Indin the tenants contribute labour to keep certain channels in repair. Does that enstem prevail in zamindari estates in these provinces?—That is a common practice in the Gya District. As a general rule, the rayats carry out these works thouselves.
- 166. Q. Unpaid' In the better governed estates they are paid and in the Government and Wards' estates of course.
- 157. Q. Has the raminder any power to enforce such customary labour f-I know of none.
- 158. Q. (Mr. Muir-Mackenzie.)—What is goam labour? That means turning out in a body to repair a breach for instance.
- 160. Q. (Mr. Rajaratna Mudaliar.)—Would legislation be necessary in the direction of enforcing such customary lobour?—There is no necessity for it.

160. Q. Have not these pains been repeired by village Mr. C. E. A. labour from time immemorial?—I believe sq. In bhaoli W. Oldham. districts it is primarily the zamindar's duty, und I would enforce the execution of their duty,

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- 161. Q. The original construction is borne by the zamindar, but the subsequent maintenance is shared between the zamindar and the tonants?—That is the principal system is vogue in the Gya District. It is regarded as the duty of the zomindar to mointain these works in a propor state of
- 162. Q. It would be regarded us the duty of the zumin-dar were there a record-ot-rights drawn up to-neorows? That would depend upon the Settlement Officer. ectainly suggest it.
- 163. Q. (Mr. Rajaratna Mudaliar.)—Suppose pains get out of order, has the tonant day right ugainst the samindar in the Courts under the Tononcy Act ?—Not that I know of.
- 161. Q. Mr. Mylne said that the zumindars had no facilities for enhancing rents even in cases where they carried out improvements themselves at their own cost. Do you accept that !- No. I would refer you to the Bengal Tenency Act
- 165. Q. In granting leans do you give them in instalments or in one lump?—In instalments for Land Improvement loans.
- 166. Q. (Mr. Muir-Mackenzie.)—How about Wards and Gavernment estates have you made any improvements or ahars?—Mony, and we have been able to extend irri-
- 167. Q (Mr. Allen.)—Would you look at the preamble to the Board's rules for the Agriculturists' Loans Act? There is a distinct intimotion to district officers there that they are not to supersede the mahajans. Has that any effect in restraining Collectors from diebursing money under that Act?—Very little.
- 168. Q. Under the Lands Improvement Act rules Ithink there is no power for Sub-divisional Officers to disburso leans, and under the Agriculturists Leans Act they have power only on delegation from the Collector?—Such powers are always delegated. My Sub-divisional Officers have powers under the Lands Improvement Act also.
- 169. Q. (Mr. Rajaratna Mudaliar.)-Concerning u not known a tennut pay more than his share?-Yes. I have not known cases where he pays more than the landlord pays to the Government, but I have known many cases in which he pays the entire cass. He ought to pay half.
- 170. Q. Hovo you no power to prevent it ?- Wo are powerless to prevent it. The raynts, as a rule, ucquiesce in anch action.
- 171. Q. (Bir. Allen.) You spoke of the commutation of bhaoli tenure into nakdi on a large scale. Would not there be a difficulty in getting the tennuts to combine to keep up their gilandazi? If it were done on the lives I suggested, there would be no difficulty whatever.
- 172. Q. But the legislation you proposed had reference to pains to large works? You would not propose legislation in order to keep up abars?—Yes, certainly I would.
- 173. Q. (Mr. Muir-Mackenzie.)—Would you not require a very large inspecting staff?—Not necessarily. Rayuts would soon complain if a landlord were not maintaining his pain and propriotors also. It would come to the knowledge of the Collector, and he would know when to depute an officer. It would not require a standing army of inspecting officers.

# SECOND DAY.

# Bankipore, 25th October 1902.

WITHEST NO. 9-RAT BAHADUR BAIJ NATH SINGH of Gyn.

(To President in vernacular.)-lice is grown entirely from ahars and pains. Disputes regarding the distribu-tion of water are frequent. It would be a good thing if decisions regarding them rested with revenue officials, who are experienced in auch matters. There should be a right of acquisition of land for private irrigation works, but care should be taken that no injury is done to the adjoining

Rai Bahader Buij Nath Singh. 25 Oct. 02.

# WITNESS No. 10.—BABU MAKHAN LAL CHATTERJI, Deputy Collector, Shahabad.

Babu Makhan Lal Chatterji.

25 Oct. 03.

1. Q. (The President.)—I am the Sub-divisional Officer of Bhabua. I have been there for a year and nine menths.

2. Q. Where were you before !- In Gyn.

- 3. Q. During your time was there any distress for want of water ?—Yes, last year there was a scanty rainfall, for which there was apprehension of scarcity, but there was no scarelty.
- 4. Q. Can you make any suggestion as to what can be done to help the people there as regards water ?—Yes. There are four or five rivers waich come from the hills, and if they were bunded, it would do immense good to the people there; the Karamassa, for lustance.
- 5. Q. Would people be willing to take the water every year, or merely at times when the mins were scanty?— Every year, just as they do at the Sone Canal.
- 6. Q. It would be a very costly work to make a bund on slarge river like the Karamanassa. Would the people be willing that a cess should be laid upon the land of two or three annas au acre on the whole of the land protected—that is a sort of insurance against famine f—I do not think they would necept that. They would be perfectly willing to pay the cost of the water they naid, but over and above that any cess would not be welcome.
- 7. Q. And would they pay as much water rate per bigha as they do at the Sone Canul?-Yes.
- 8. Q. In your Sub-division is the land generally fit for irrigation? -Yes.
- 9. Q. flave you any black soil there—heavy soil?— There is a blackish soil called Lare!? That is fit for enddy cultivation.
- 10. Q. And in the plains is there any soil unfit for cultivation at all?—No, almost every such of land in the Chabes Sub-division is fit for cultivation.
- 11. Q. Is the cultivation carried on now by means of pains and abars ?- There are abars, but no pains. They are not many.
  - 12. Q. Why is that f-Because the people are poor.
- 13. Q. Do not the samuelars make them ?- The ramindare also are puer.
  - 14. Q. What is the usual system of cental? Blanch.
- 15. Q. Sappose the engineers think the Kammrassa acheme too expensive to make, what could you do to encourage the making of abars? Do you think that reverament advances should be given full do not think that reverament advances readily. They have not done so for the last 10 years, except in 18:05-18:07, when there was actual families. They think they will not be able to my afterwards for they are not extrain will not be able to pay afterwards, for they are not certain that they will have good crops.
- 16. Q. I suppose it means going to the brad-quarters of the district for our you give advances?—We can if the Collector delegates his powers to us. An officer gets these powers as soon as the asks for it.
- 17. Q. Hate you no well irrigation?—Very little. It is not the custom in it e Sub-division.
- 18. Q. In much rabe grown ?- Yet-wheat, engarcine, poppy and barley.
- 19. Q. The wheat and the barley, I suppose, get on with the min?—For these also they want true aton.
- 20. Q. Why should they not do it with welts f-That is not the custom. It is also expensive.

  21. Q. Is the water very deep below the surface f-Not very deep, but they no wells only for poppy and cane.
- 22. Q. A well ke-ps water going for a much longer time than an ahar !- Yee, but they will not take to n.
- 23. Q. (Sir Thomas Highars.)—Do they grow much poppy !—I suppose atout 20,000 acres.
- 24 Q. And they depend now entirely upon the rain?-Yes, and wells. 25. Q. They get good crops now : why would they lake water from a canal ! - If they got sufficient water, I sup-
- pose they would be able to irrigate more land.

- 26. Q. But would they over want the water for rabi ?-Not in good years; but the good years are so very few. For the last ton yours, I suppose, there have been only two or three good yours.
- 27. Q. Would they pay a coss for the sake of hoving a coal if the land-cover guaranteed to contribute? It would be a great safety for them?—I think they would guarantee that they would take the water, but they would not pay a cess.
- 28. Q. But suppose it is a very wet year, they will not take it and will not pay for it. Will they guarantee to pay for it whether they use it or not !—The lease system covers them. In one portion of my sub-division, in the north-east corner, there is an area of about 17,000 ares which is irrigated by the Sone Canal, and they have nover refused to take water for the kharif as well as for the rabi.
- 2D. Q. Sometimes the people do not take the water at all for the rab; how do you account for that? There are 120,000 acres of average rab; on the Bone Cansi, and sometimes at falls to considerablyles?—But we have 70 or 75 per cent. of paddy land in our Sab-division. They would always take it for puddy. And they would take it for rabi too, for in every village, there is both paddy and rabi land.
- 80. Q. (Mr. Muir-Marlenzie.)-At first water scoms to have been taken up rather more sparingly in the earlier years than in the later on the Sone Canal. Would the same sort of thing take place in Rhabus f Would tley heritate to take mater f—No. They are anxious to have it. They have seen their neighbours taking water and the advantages they have derived from it.
- 31. Q. Have you generally naked for powers for takeri?
  -Yes. This year I granted forms to some tenants.
- 32 Q. How many altogether?-About Rs. 210 or Rs 250, each loss amounting to about Rs. 5. That is for eved and cattle. There is no demand for akars or wells or works.
- 33. Q. Have you ever tried to create a demand f-As far as I could, but they would not listen.
- 31. Q. What about the disbursement of these leane? Did you take the mency with you and disbure it on the spat! The tenants exise to the head-quarters of the Subdivision and I disburred the amounts myself to them.
- 35. Q Do not you think you could have got till of more money if you had disbursed it, in camp f-Yes; but these were all tion-mount estate tenants. I have not advanced ontside that this year; only in the familie year.
- 26. Q. Having taken a braness in the famine year, might not the people have been more disposed to take them than before the famine !- At may rate they alld not come.
  - S7. Q. The familie less made no difference ?-No.
- 18. Q. (Mr. Reservices Mudalise.)—Do you think the tenants preferred to borrow from makejune!—I do not think they did either.
- 19. Q. (Mr. Muir-Mockeusie.)—Is there not much indebte muss?—There is, but they are indebted to the ramindere.
- 40. Q. (Mr. Rajaraina Mudalier.)—Do the ramin-dars tend out large sum, ?—Thry do not lead out much men y; they advance for a ed and cattle.
- 4t. Q. Supposing a lith of rupes were glaced at your deposal and you were allowed further powers to grant lime, would you be able to push them full do not think I should be able to distribute all that money. Less year I tried to induce several similars to take lears, because there was apprehension of searcity, but they would not come for them.
- 32. Q. Is there seepe for improvements for above and pains in your Sub-division?—Not for fains; above might be increased, but the zemindars are so very poer that they heditate even to take money from Government, as they are so uncertain of creps.
- 43. Q. But it is principally in such cases that the construction of ulture would be advantageous?—But it is not the rustom.

# WITNESS No. 11 .- Band Chriten Burs Sanat, Ziminder, Shahabad.

- 1. Q. (The President.)-In what part of the district are Babu your lands?-In Piro, Nanour, Panwar and Arrah Pergun-Chutter Bhuj Sahai, pahs.
- 2. Q. Are these districts irrigated by the Sone Canali-25 Oct. 02. Largely.
- 3. Q. Have you say lard in the unirrigated part of the district?-Yes.
- 1. Q. Is the difference very great in the value of the land where it is irrigated and where it is not i-It is. I cannot gire any exact figures.

- 5. Q. How much?—A great part of my dietrict is guzashta lands, boldings for fixed rents or occupancy holdings. There is very little chance of an increase of rent in such cases where the nakdi system prevails, whether the land is irrigated or not. But in bhaoti tenure the benefit is shared beth by landloid and tenent.
- 6. Q. But where the nakdi system prevails, does not the landlord obtain any benefit?—Not where there is guzashta. In one sense it means land which rayata have had from the time of the permanent settlement, and another sense of it is occupancy rights, having a field mero than 12 years.
- 7. Q. Suppose canals were made in the Bhabna Subdivision, do you mean to say that the zamindar will not be able to get a higher rent for his land?—Not where there is nakdi with guzashta right. Of course the bulk of the land
- 8. Q. Do the Sone Canal arrangements work satisfactorily generally?—Yes.
- 9. Q. Can you suggest my improvements ?—I have heard from my own tenants that they were not able to get water; not thet it was refused, but that the authorities could not grant applications.
- 10. Q. Do any of your lands depend upon ahars or pains, and not upon the Soue Ganal?—There are no pains in Shahnbad District at all. There are ahars; some in fairly good condition; others neglected; the latter in Bhabua mostly, where irrigation works are argently wanted.
- 11. Q. Is that because of the poverty of the rayar or laziness?—The properties are always being put up for sale for arrears of Government revenue.
- 12. Q. Would not these men derive benefit by horrowing money from Government? They do not appreciate that much. There are difficulties in receiving it in time and the uncertainty of having good erops and their inability to repay with case. It may be a losing centern after all.
- 13. Q. Do you think the system of recevery is too severe? -It is not at all suited to the people of Bhabua.
- 14. Q. Can you suggest any change in the system ?—I am not a believer in the takevi system at all.
- 15. Q. (Air. Muir-Mackenzie.)—Can you tell me whether the nakdi system was generally in force over the Sono Canal area before the Sone Canal was epened?—In my estates the nakdi system largely prevails. The management was not in my hunds before the Sone Canal was opened and since my time there has been little commutation. The people prefer the bhaoli.
- 16. Q. Where nakdi rents prevail the landlord has extreme difficulty in procaring any enhancement of rent?-Very
- 17. Q. Is he on that account deterred from making improvements?—Certainly.
- 18. Q. Section XXX, clause (c) of the Tenancy Act, says that the landlord of a holding on a money rent may institute a suit to enhance the rent on the ground that the productive powere of the land have been increased by an improvement effected by or at the expense of himself?—Then that has to he established to the satisfaction of the Civil Courts.
  - 19 Q. Is that a difficulty ?-Yes.
- '20. Q. Whence does the difficulty arise? If a landlord constructs an akar and lo is able to show that it greatly increases the yield of the land, that ought not to be a very difficult point to prove?—If the akar be new altogether, it will not be a difficult matter, but only in cases of throwing up earth-works or making gilandazi, the tenant will say that it is the duty of the laudlerd to keep up repairs and for simply doing his duty ho is not entitled to noy enhance-. mont.
  - 21. Q. Would you prefer to see any pewor given to the Collector to regulate such cases f—Yes, because from my own experience I can say that if one has the papers of the Collector, it is not difficult to prove the improvement in Court.
  - 22. Q. The amennt you can demand has not been much increased by the introduction of the Sone Canal, but has it not been made considerably more secure? You have much less difficulty in realising the rental than before !- Certainly.
  - 23. Q. What is your great objection to the takari system? -The full amount does not reach the tenant. I should not be surprised to hear that not even a quarter has gone into
  - 24. Q. It sticks on the way ?-Yes, in various places. Then, again, the feeling of uncertainty as to the crop.

- 25. Q. Any other objection?-It may be that the money that the musts borrow is semetimes used on other objects than irrigation purposes, and then they are liable to have it Bhuj Sahai. summarily recovered.
- 25. Q. Do your tenents depend on you for advances for seed and cattle ?- No, because my tenants are in the canal area, and do not require it, being well off.
- 27. Q. Do your tenants make wells at all in the irrigated lends !--Very seldom.
- 28. Q. If they did, would not they be able to supplement the canal water usefully?—I am airsid not. Irrigation by wellsie not known in Shahabad; it is not suited to paddy cultivation, and only to a very limited extent for rabi. It is not the having a well that will surmount all the difficulties. The cost of working is conveyed. You will have to ties. The cest of working is enormous. You will have to hire bullooks and inear other expenses.
- 29. Q. Is there no well irrigation for valuable crops?-For poppy, yes; very ficely.
  - 30. Q. Is the canal not used for it ?-Not much.
- 31. Q. (Mr. Bajaratna Mudaliar.)—Supposing the loans were disbursed through the zamindars, would not that remove the difficulties to which you refer?—Matters would
- 32. Q. Could not the samindars be trusted to see that the tenants got the full value ?- The majority of zamindare ore net educated enough; they do not understand the duty they owe to Government and to the raigats. That would be a very bad step.
- 23. Q. There is said to be difficulty in getting the Courts to grant bigher rents f-Fer eld works. It is the duty of the zamindar to maintain irrigation works in an efficient state of repairs. There have been no new improvements. But if tho tenants enter into a contract respecting repairs, there is no difficulty.
- S1. Q. Under the bhaoli system does the zamindar pay any portion of the water-rate to Government where the works are constructed by Government?—Yes, when a joint application is made beth by the lendlord and the tenants the landlord is bound to pay.
- 35. Q. But in nine cases out of ton the zamindur will not join in the application?—Yes, but frequently now the tenants recover half the portion from the zamindar privately. So far as I know zamindars do pay, but not to the canal authorities.
- 36. Q. If the zamindar refuses, can the tenants recover?
  —Yes, for good done to the zamindar, under section 70 of the Contract Act.
- 37. Q. Does the tenant contribute any portion of the cost of repairs to ahars? - By contributing labour in como places, by the labouring classes, not Brahmans and Chhatris.
- 38. Q. Have you may power to enforce this customary labour f—No, but they think it is to their advantage to repair ahars; and there is no difficulty at present.
- .39. Q. (Mr. Allen.)—Is there any custom in Shahabad before a rayat makes a well of paying saluami to his landlord?—I do not know of any instance, but I should not be surprised to hear of an unscrupulous landlord domanding it.
- 40. Q. (Mr. Rajaratna Mudaliar.)-It is not a case of unscrupulousness; it is a nazar, a mark of respect.
  - 41. Q. (Mr. Allen.)-And for taking so much land.
- 42. Q. (Mr. Rajaratna Mudaliar.)-In your own estato do you pay any portion of the water-rate?—I have paid in some coses.
- 48. Q. (Mr. Allen.)—Your tenants have not applied for the commutation of bhaoli rents. Is that due to the fact that they have to pay ne pertien of the water rate?—Net so; but because they pay according to the yield, taking the risk of good and hed years.
- 44. Q. As regards the zamindars of Bhabua ?—They are very poor. They have been sold up. They have become poor by extravagence, and enormous amounts are spent in marriages and deaths.
- 45. Q. Hew do they compare with those of the Sone area? -They are worse off.
- 46. Q. Is it not because they do not get their rents in so well?-That is one reason.
- 47. Q. About landlord's improvements; under section 88 he can register an improvement ?-Yes, but they do not do that largely; mestly on account of ignorance of the prevailing law, and also because they do not take the trouble and do not eare.

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  Bhuj Sahai, ground of improvement and has shown n register of the improvement P—I think not.
  - 49. Q. Would he have any difficulty in getting a decree if he could prove that his improvement was registered ?-Not in
    - 50. Q. If a landlord can get a raigat to agree to an

chlancement of rent on the ground of improvement, he can do so by contract?—He can.

- 51. Q. And also before making his improvement come to an agreement with the raigat to pay an enhancement if the improvement is carried out?—Yes, and there is generally an understanding to that effect.
- 52. Q. As regards forced labour on bunds, is it enstomary for the zanoindar to feed the labourers whilst working?—Yes, that is an equivalent of wages.

## Copy of a lotter from the Hencurable Bahn Churren Burs Sanat, Arrah, dated Arrah, October 1902.

I was examined as a witness before the Commission on the 25th instant at Bankipore. One of the questions raised in my ovidence was, whether there was any difficulty in obtaining a decrea from the Civil Court on the ground of an improvement effected by the landlord. I stated that there was a great difficulty, and this statement was made larving regard to the provisions of section 33 of the Bongal Tenancy Act which controls clause (c) of section 30 of the Act pointed out to me by one of the Honourable Members of the Commission. Each of the clauses of section 33 imposes a limitation on the question of the amount of enhancement and minimizes the measure and chances of success in a suit for enhancement of rent on the ground of an improvement. The difficulty is further enhanced by the provisions of section 50 of the Act, which enects that the rent of a raisest shall not be increased if he has held the land from the time of the be increased if he has held the land from the time of the

permanent settlement without any variation in the rent except on the ground of an alteration in the area of the holding; and under sub-section (2) of the section it shall be presumed that he has so held if it be proved that he has held at a rent which has not been changed during the twenty years lumediately preceding the institution of the suit. No doubt this presumption is relutiable, but to rebut it is a Herenlean task, and if he fails to rebut, there can be no enhancement, as the rent of only an occupancy rotat can be enhanced under the law and not of the raiyet who is holding from the time of the personnent settlement. On these grounds I sald in my evidence that enhancement on the ground of an Improvement was attended with difficulty. I have the honour to request you to be so good as to lay this before the Commission for consideration.

WITNESS Nos. 12, 13 AND 14.—BADE NABSING SAHAT, BART GEPAR SINGH AND BURE RASE BADAR SINGH, all ramindars of Sub-division Ilbahua, District Shahabad.

Balut Narsing Sahai, Singh and

- 1. (The President.)—There are few abars in Bhabus and they are in had repair. The people are very root and cannot afford to construct abars. Both ramindats and Babu Gudar raisuls are poor.
- Singh and

  Babn
  Borrow from Government f—Because they would not be in

  Ram Balan a position, they fear, to topay the loan, tecause if their

  Singh. crops full, they will not be able to repay thelean

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- 3. Q. Is not that rather unreasonable? With a new abor the people would be better off. Suppose the Sinkar takes it look in 20 years !- They fear that these rument may not get their money back.
- 4. Q But the raisest would get a lot back. If they had water by canal, would they take it every year!—Yes, they are greatly vanting water.
- 5. Q. And would they pay as high rates as on the Sone Canal !- Yes.

- 6. Q. Suppose the Sirker found it costs too much to make great counts for Bbabna, the yen know of any way in which afters could be encouraged?—There will be a difficulty in gotting water, because the present proprieters will not allow water to accommulate in i ew uhars.
- 7. Q. (Mr. Mair-Machensie.) Habars arounde without any large nocks or canals, will they fill from the existing minfall?—In a net of the years, not.
- b. Q. If they had water, would they greatly forcase the rice area f -- Very much.
- 9. Q. Is there much waste had upon which they would now it?—About one-righth of the whole area. It nould In that care be cultivated.
- 10. Q. (Mr. allien)—The Karamaa-a comes down in field; does it not!—Yes southmes.
- 11. Q. Does that interfere with your making abore ?-

WITNESS No. 15 .- Mm. UPPNDBA NATH GHOSH, Deputy Collector of Arrali.

Mr. Urendra Nath Ghosh.

- 1. Q. (The President.)—How long have you been Deputy Collector?—Since 1890.
- 2. Q. You must have moved about a great deal among the cultivating classes and heard a great deal of what 25 Oct. 02. they said. Are they contented with the canal management, or do they feel it hard upon them?—They are con-
  - 3. Q. You make calculations on the measurements given you by the canal authorities, and you are under the orders of the Soperintending Engineer ?-Yes. Calculation of rates are made by Divisional Canal Officers.
  - 4. Q. Are the inconnements finished by the time the crop is ready?—Generally.
  - 5. Q. So there are no disputes as to whether the land has been watered or not?-Very few.
  - 6. Q. Are there many complaints as to incorrect measurements ?-No.
  - 7. Q. Is the canal irrigation popular f-Yes. It is apparent from increase of leases, in cases of long leases, seven years; it is increasing, that is, for paddy. The increase is striking in Areah Division.
  - 8. Q. (Mr. Muir-Machenzie.)—Is by far the larger amount of revenue collected in leases F—Yes, about one-third of the whole demand is in ecison leases, and nearly two-thirds in long leasur.
  - D. Q. Da you think the rates could be raised?-I believo long leaso rates could be raised, and that the people

would pay them. At present it is its 1.0 per bigla, or Rs. 2.8 an acre. That will be raised in ICO3 to Rs. 1-14. which can be raised still.

- 10. Q. In riveh water wasted?—No. With the season least other utilize the last drop of water they get.
- 11. Q. Are the water-cont-ce kept in repair ?-Yes.
- 12. Q. Don't the carte ent into the water-courses and let the water flood into the roalf-No.
- 13. Q. (Mr. Rujarotta Medaliar.)—What is your present staff.—The present staff is a Deputy Collector in charge of the returne division, two Sub-Deputy Collectors. There are 7 circles, and each circle is under a rilladar who supervises the work of collection, and there are 30 talksildars. Each talksildar is given two poons to make the collection. There are clorks and mohurrers, peons, and an accountant for office work.
- 11. Q. What is the total arm irrigated ?—I have no got figures with me. (.1 coice: It averages about 450,000 Our rentallast year was Rs. 10,69,800.)
- Our rentaling year was its. 10,00,000.)

  15. Q. Would it not be possible to reduce the staff if the assessment is much ever to you with a staff of aming fer measurement. F—The measurement and assessment can better be done by the staff that regulates the water. The mater is regulated by the engineering staff. They know how much is irrigated, and it is better that they should measure and assesse. The tenants are always likely to mislead me, and I must ask the engineer to correct them. That means they must have as much staff as they have at present, except eight or nine amins in each sub-division. present, except eight or nine amins in each bub-division.

- As regards the leass, would it be advisable to extsnd it !—In Madras leases extend 30 years. The seven years is being worked well. Unless all conditions are the same, the porrod of enrrency of o lease cae't be the same.
- 17. Q. Do not the raiyats object to sudden changes?—
  Not much. When you will come to the maximom point you can stick at it. Seven years is long enough. The enhancement, when it is mude will be made according to their income; if there is no increese of income, there will be no increase of the rates. inorcase of the rates.
- 18. Q. Do not you think your establishment might be reduced if the certificate system were more extensively adopted?—We ore reducing our establishment as much as we can. The cost of the collection is now about 6 per cent. The area concerned is too widely scattered for fewer men.

  As it is they do not generally come forward to pay.

  We have no offices and the talisidars would have to go into the villages and beg them to pay their rates. The certificates we have issued for non-poyment of rates have been reduced from 10,000 to 300. The Commissioner or Collector does not think it advisable to collect hy certificates so long as it can be collected by other means. If they do not pay the

rates regularly, the water is stopped. The greatest trouble is to reelise from the petty zamindors.

19. Q. In Mudras the collecting staff is not much ?- I am Nath Ghose. not aware of the Madras system. In a compact area the collection one be made with less staff. The orca of Shah- .25 Oct. 02. abad District slone is 4,000 square miles; excloding 1,300 square miles of Bhabne, which is not irrigated, the erce to be traversed for collection is too large for the staff.

20. Q. What do you think if the collection is given to zamiodars?—I did not try the system. All that I can say is that all zamindors do not pay their laud revenue without the son-set low being brought ioto uss; collection of cess through them is not a success. through them is not a success.

21. Q. Whot do you say to the transfer of the department to the Collector?—The department is working well as it is, as far as I con sec. The Seperintending Engineer himself shows anxiety for successful irrigotion.

22. Q. Do you receive any comploint about supply of water? - Very very seldom. The onlitivators may be oursious for more water, but the supply given to them is sufficient to mature their crop.

WITNESS No. 16 .- Mr. J. H. TOOGOOD, Saperioteoding Engineer, Sone Circle.

(Replies to printed questions.)

I.

## A .- GENERAL.

Paragraph 1.—To the districts of Shahahad, Pntna and Gya. Hove been in charge of the irrigotion works, reads and buildings as Saperintending Engineer, necessitating trovelling throughout these districts.

Paragraph 2.—The average rainfall noted below is the average recorded of 22 statious in these districts for a period of 20 years, i.e., from 1880-81 to 1899-1900:—

				Inches.	1			Inches.
April				0.15	October			2.61
May		•		1.13	Novembor			0.29
Jnno		•	•	6.80	Docember		•	0.21
July	•	•	•	12.11	January		•	0.82
Aogust	•	•	•	11.82	Fobruory	•	•	95'0
Septemb	er		•	6.76	March .			0.35

Average annual total = 43.61 inches.

Paragraph 3 .- (1) Not in the plain tracte of thess districts.

(2) No.

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- (3) For the cultivation of the stople foods of the districts the lands are not manured. Only valuable crops ere manured, such es pototoes, poppy, segereene and vege-
- (4) Generally the soil of these districts is suited to irrigation of either rice or rabi.
- (5) Extension of irrigation in these districts would be dependent on the supply of the rivere: the sopply in them is entirely dependent on reinfull: there ere no snow-fed streams. The erops in these districts are mainly dependent on the storage of the reinfoll and its favourable distribution. Rice is the principal erop and is the staple food of the people. The important periods when water is necessary for this crop are—
  - (1) from the middle of July to the end of August (the transplanting season), and
  - (2) from the last week in September to the end of October.

Failore of minfall during either of these periods materielly affects the eatturn of the crop. During the last decennial period from 1890-91 to 1899-1900 the reinfall was for four years below average; and in two years of the romaining six. olthough above the average, the rainfall was unfovourably distributed.

. (6) On the part of the cultivators there is a lack of capital for initial expenditure, and I do not think the zamindors would come forward with copital for estrying out any extensive scheme of irrigation. Where lands ore under bhaoli or "crop-divisible" system the zamindors make ahars and circuitons embankments to rotain the raiofall for irrigation purposes: this is dene more in the Gya and Potno Districts where large areas ero nader this systom.

(7) No. I think the oultivators would be willing to pny enhanced root or revenue if they had the security of their crops assured by irrigation.

(8) The provisions of the Bongal Tenency Act are applicable in these districts. I have not heard of any complaint against this Act on the part of the cultivators: the zamindars, I believe, have objectious to it.

Paragraph 6.—I do not think so. There is o vory strong desire on the part of the people in these districts to have irrigation extended, but they do not quit their homes for the irrigated tracts, nules they are reduced to extreme poverty. Applications for irrigation lesses for large areas have annually to be refessed for want of water in the Soos Canals. In 1899-1900 applications for 40,412 oeres were refused.

B .- CANALS OF CONTINUOUS ELOW.

Paragraph 7 .- (1) In these districts, from rico-fields irrigated from the ennals, o pairs or eatch-crop is invari-obly secured of kesari, haseed and gram: the value of the produce would range from Rs. 8 to Rs. 12 per aero.

(2) The sugarcnae enlitvetion has been doubled since the construction of the Sone Canals: its extension is limited to the het-weather supply available.

(3) (a) Ten per cent.;

(b) Thirty to fifty per cent.;

(c) Three to nine times the yield ;

in fact, any unirrighted crops would yield nothing whotever.

Paragraph 8 .- (1) Rs. 4 per sere.

(2) Rs. 20 to Rs. 30 per nere.

Rs. A. Paragraph 9 .- (1) Long-term leases (mninly taken for kharif).

Kharif scason lenses RabiHot wcother (sugarcanc) 4 0

These are the rates on the Sone Canals in 1901-1902 onid to Government by the cultivetors of the land and maid for the actual area irrigated.

(2) The owners arrigated.

(2) The owners have no legal right to enhance the oultivators' rents on account of the onnal irrigation, hat undoubtedly they have done se, and rents for makdi lands have been doubled and, in some cases, trobled in Shahahad; where rents were formerly Bs. 3 an aere the on livetors now pay Rs. 6 and Rs. 9 on an average. The owners of bhaoli lands have, of course, participated in the increased yield of the fields due to irrigation.

(8) Nothing beyond the water-rates mootioned above is paid to Government.

Paragraph 10.—The water from the canals is brought to the fields through "village chonnels": these are generally constructed by the villagers orranging amongst themselves collectively. Where the villagers are unable to construct them, opplication is made to Government for their coastruction, the cost being defrayed by subscription

Mr.

Upendra

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from the applicants; in these cases there is no recoupment. Where channels are constructed by zamindors or thikadors, village channel rent is realized by them, the rent being 25 Oct. 02. lixed by the Canal Officer.

#### -WELLS.

Paragraph 34 .- (1) Thirty feet.

- (2) Percolation.
  - (a) No.
  - (b) Most probably.
- (3) A well, 3 feet in diomoter, with 10 inches steining and 36 feet depth, was made at a cost of oboat Rs. 60 to a villager in Arrab.

A well, 6 feet in diameter, with 10 inches steining, 42 feet deep, and from rods driven down fo feet into the seil, was made at a cost of Re. 200 in Arrah by a villager.

- (4) About 60 years, if well constructed.
- (5) By (a) latha, or lever ond bucket.
  - (b) moth, or leather beg worked by bullocks.

(6) and (7) From a 3-feet diameter well, as abovo, in which two lathas are worked, 10 bighas may be entirated; from a 6-feet diameter well, as above, in which a moth is worked, 15 bighas may be cultivated.

Paragraph 38.—In these districts neither under (1) nor (2) are there difficulties; wells can olimost everywhere bo dng and constroomd.

Paragraph 39.—Yes. A water-rate on the area commanded abould he charged to recoup Government for the cost of construction.

Paragraph 40.-Yes. They irrigate from 2 to 3 acros by advancing n small sum to the villegers towards their construction.

II.

The Sone Circle extends over the districts of Poten, Gya and Shnhanad.

As regards Patna, the western portion is protected by the Sone Canals. In his report on the familie of 1896-97 tho Commissioner remarked-

"No parts of this district were ever seriously in denger: the rainfull was not so deficient as obswhere, and every available drop of water from the Sone Canuls was utilised Fears were at first ontertained for the Islampor Thann in the Bibar Sub-division, but these econ passed airay

The Bihar Sub-division again is divided into hills in the south and the low country to the north; the whole sub-division is intersected with etreatus, and the greater part is provided with a system of reservoirs (ahars), some of which are filled with rain-water and natural drainage, while others are replenished by damming the rivers. An elaborate system of conduits (pynes) conveys the water from the rivers to the reservoirs and again to the fields of the oultivotors.

This district is extraordinarily well supplied with communications

As regards Gya, the Commissioner in the same report

"Gya was is oven less danger of famine than Paina: the whole of the western border is protected by the Sone Canals, and almost all the remainder by the local system of reservoirs and channels obove alluded to."

As regardo Shahebad, the greater part of the plain portion As regardo onaneusa, the greater part of the prints portion is protected by the Sone Canals; the unprotected tracts lio south and west of the district in the Bindan Sub-division and part of the Sassoram Sub-division. With reference to this district and these tracts, the Commissioner of Patna in his Femioc Report remarks

"18. This district also suffered from the general rise in prices, but awing to the stocks generally held, no part of it was really distressed except the extreme south-west corner comprising the Bhabne Sub-division and a part of that of Sassaram with an arco of 1,301 equore miles: this tract consists of two shorply defined portuns—the hills and the plams.

19. The whole of the couthern part of the Bhabna Sub-division, and much of the conthern portion of Sassaram, is occupied by the Kaimor innge of hills which cover an area of 700 square miles, with a population of about 20,000 persons, thinly scattered over an undulating ploteau covered with forest for the most part. A great portion of this area

is occupied by Government estates. Here the crops are poor and precarious, and depend greatly on the rains, for with the exception of a few village wells, and still fewer tanks, there is no prorision for a water-supply. Food-supplies are brought up from the plains through difficult passes which, always impassable for wheelechtrafite, become closed even to pack animals when the monsoon case sets in. There was a serious failure of crops all through the hills, and it was feared that unless early steps were taken to bring plenty of grain on to the platean, there would be real want of foud: it was therefore mranged that the local market should be empilied in good time through a graio-dealer appointed by the Collector. Rents were surpended in the Government estates, and considerable advances were given to the cultivators both for wells and seed-grain: lestly, a little gratuitous relief was administered, and three relief works were opened for about three months. Owing to the showers in the rold weather, and probably from the existence of private stores, the people passed through the ordeal better them was at one time expected.

20. The remainder of the distressed tract in this district is occupied by Government estates. Here the crops are

20. The remainder of the distressed tract in this district comprised the plans part of the Bhabus Sub-division and the Chenary outpost of Sassaram, and is again divided fato two parts lying, respectively, north and south of the Grand Trank Road. The part to the north was nut severely affected, and test works which were started in Octobor were affected, and test works which were started in Octobor were shandoned by the end of that month, and not afterwards resuncd. In the countern pertien lying, between the hills and the Grand Trunk Itond the distress was much more acute. This tract is chyracterised by very poor soil, growing bardly muthing but aghani rice, which in 1996 was a total failure; there is little or no irrigation. Moreover, the cultivators are hexport and imporerished, and the hysique of the people is poor and their general condition bad. The grain marts of the sub-division, such as they are, are supplied either fram Sassaram, some 28 wiles from Bhabua along the Grand Trunk Road, or more largely from the Zamania station of the East Indian Railway, which is the Zamania station of the East Indian Railway, which is at the rame distance from the same place. Relief works were opened here at the end of October and were continued were opened here at the end of October and were continued till August 1897; much was expected from the Moghulsern Railway running clong the north of this tract, the construction of which was commenced in 1895, but for various reasons it failed to attract employment. Owing to the fullure of the Sub-divisional Officer of Bhabna to give early and complete information, the people ran down a good deal and relief works and gratuitous relief works were organised by the Collector in February, not a day too soon. Gratuitous relief was greatly curtailed by the middle of September, and ceased allogether by the end of that month."

With reference to paragraph (1) of the memorandum of points to be considered by the Irrigotion Commission in Bengal for districts or tracts liable to famine or scarcity, I shall confine myself to supplying information as regards the Bindous and Sassaram Sub-divisions which were affected in 1896-97.

(a) Gross and cultivated area, average gross area annualty under crop.—This is shown in the following statement :-

Sca-D141	)103f		Gross eres lu acres.	Totat e-timaled cultivaled area in	Approxi- male normal area under winter	area :	nue in
			BCCCS.	neres.	1900.	toot.	
1		2	3	4	8	a	
Eastaram Dhabea	•	•	832,640	518,470 470,000	\$53,000 313,500		153,390 280,000

These figures are obtained from the final report on the winter rice crop of 1901 published in the Supplement to the Calcutta Gazette of 11th December 1901.

(b) The probable proportions of the cropped area irrigated by Government verigation works, by private or village works and by wells, respectively.—About half the area of the Sassaron Sub-division is commanded by the Government irrigation works. I have me available information as regards the proportions irrigated by the other sources mentioned, but os noted in the Commissioner's famino report, these sources of supply are very limited.

(e) General configuration of the country, character of the soils and their suitability for irrigation.—The

southern portions of these sub-divisions are occapied by the Kaimor range of hills, covering an area of about 700 square miles, the plateau is undulating, thickly wooded; and sparsely populated. The morthern portions from the bills to the Ganges present the ordinary flat appearance common to the valley of the Ganges in Bihar. Those are extensively under outlivation and fairly planted with trees. The soil is chiefly alluvial; there is a considerable area of kewal soil (n brownish black clay) in the affected tracts in which aghani or winter rice, the staple food of the district, is sown; but as it is dependent on minfall, it fails or yields a very poor crop four ont of seven years. If irrigation is provided, there is no doubt in my mind that it will be highly appreciated and much sought after, and that the experience of the Sone Canels will be repeated, viz., that rabi lands will be convorted into rice fields.

(d) Extent to which cultivation is dependent on artificial irrigation; statistics of annual and monthly rainfall.—
As already stated, the rice (principal crop) fails or yields but a poor return in foar ont of seven years. Owing to the insufficiency of the rains, only small areas as are under ahars (embankments thrown across the drainage lines) coming to maturity. The accompanying two statements show

Appendices A, B and C. at the head-quarters of the Sassaram and Bhabua Sub-divisions for the last 21 years. It is curious to noto that the average is almost identical. A third statement also is appeaded showing the rainfall at Basawan, midway botween Sassarum and Bhabun, and lying about 8 miles further north.

- (0) Years in which reliable records show that there has been (1) famine and (2) severe searcity not amounting to famine.—Thore was famine in 1896-97 and, owing to the seauty rainfall, searcity in 1828. There want have been a considerable failure of the rice crop also in 1883, 1887, 1891, 1892, 1895, 1898, 1899, 1901 resulting in the impoverishment of the received. ment of the people.
- (f) Stople crops for each main class of soil; times at which sown and reaped; what are the crops which require which sown and reaped; what are the crops tonion require irrigation and how many waterings do they require and at what times of the year?—Thu staple or main crops sown come under one of the following seasonal classifica-
  - (1) Kharif, aghani or winter rico;
  - (2) Rabi or spring crop;
  - (3) Bhadoi or autumn crop includes autumn rico:
  - (4) Sugnrease (porenuial).

The lands are classed necording to the crops they bear, viz., (1) rice or paddy lands, (2) rabi lands and (3) sugarcane lands. Bhados crops are usually grown on rabi lands.

Paddy lands are divided into two classes, viz., (1) these nown in sandy lands (locally known as bangar, bal and balmat), and these sown in clayer and learny soils (locally known as kewal, kerail, doresa). The former bear only one crop in a year, viz., paddy; the inter bear a eccond or catch-crop in the spring, such as kesari, gram and linseed, ctc., sown just before the paddy is out.

Rabi lands ore of the clayey and leamy soils: that known as kerail is best suited to the growth of rabi. They are also divided into two classes; thuse which bear cerents only and those (the better lands) which are double cropped, with an antumn (bhadoi) orop as well, such as marua, kodo, makai and sixty-day rice (serah sathi).

Sugarcane is sown principally in the clayey and loamy soils known as kereal nad dorosa. The fields in which sugarcane is grown are sown with either one or the other of the seasonal crops for one or two years before being resown

with sugarcane. The accompany-ing table compiled for this circle Appendix D. shows the time of sowing and reaping, inigation required and when of the principal crops grown in the country traversed by the Sono Canula.

(g) Utility of irrigation in increasing the produce of the land and in securing it from the effects of a failure of the rainfult.—The crops, especially rice, are dependent on the rainfall; and there can be acceptantive cultivation in the rice crop or even the rabi or sugarcone crups unless some means are adopted to store the rainfall, and irrigate them at the most suitable and favourable times. Unless, therefore, some means of storage and artificial irrigation are adopted, the produce must be adversely affected. In the tracts under consideration the system of ahars or shallow surface reservations but it records constantially storage of country with the storage of country with the storage of country with the storage of country with the storage of country with the storage of country with the storage of country with the storage of country with the storage of country with the storage of country with the storage of country with the storage of country with the storage of country with the storage of country with the storage of country with the storage of country with the storage of country with the storage of country with the storage of the storage of the voirs exists, but lu years of scanty rainfall they run dry and a vory small area, if any, is brought to muturity; this

failure of crop, as has been stated before, occurs probably four out of seven years. With a systematic scheme of irrigation, such, for instance, as the Sone Canals, and prohably storage reservoirs, sach as proposed for the Karmnassa and Durgaoti rivers, with distributing channels, the produce of the land in these tracts will undoubtedly increase and security will be afforded in the event of failure of the rains. In the famine wear of 1896-97 and in 1901-1902 and scourity will be altorded in the evoat of failure of the rains. In the famiae year of 1896-97 and in 1901-1902 it is estimated that, respectively, not less than 33 and 35 lakbs of manuals of grain were added to the food-supply of Bihar by the Sone Cauals.

Two tables are annexed showing the results of orop experiments from 1897-98 to 1901-1902 since a more entermatic system of experimenting.

since a more systematic system of experimenting was introduced. In the case of rice the results are more favourable to the canals than in the case of rabi.

(h) General measures which should be adopted for (A) General measures which should be adopted for extending irrigation in each district, either by Government or private works.—The coastruction of storago reservoirs in the Karonnossa valley and possibly also in the Durgaoti valley, with a high level canal and distributing channels, are the works that suggest themselves for the irrigation of the affected tracts. The cost of carrying out these schemes would preclude their being taken up as a private outerprise; they would therefore have to be undertaken by Government. undertaken by Government.

Paragraph 2.—Existing Government irrigation works (Imperial).

The Sone Canals. - Particulars were forwarded to the Chief Eagincer with this office No. 4043, dated 3rd October

Paragraph 3.—Proposed new Government works, etc.—There is the Karmanssa project and possibly the Dargacti project. Particulars regarding the former have been fully recorded in Chief Engineer's note on Mr. Maconchy's report, paragraph 114, et eq. As regards the Dargact, its drainage area up to the point where the river debouches into the plains, i.e., about the probable eite of dam, is about 310 square miles. A rainfall of 12' over a squere mile is equivalent to about 28 million onbio feet. In years of extreme drought, from the rainfall retarns of squore mile is equivalent to about 28 million ombio feet. In years of extreme drought, from the rainfall returns of Sassaram, a total fall of 22.5 inches may be anticipated during the kharif scason, of which probably two-thirds or 15° may be stored, giving a total storage of (310×28×1½°) = 10,850 million cubic foot. The following are the areas commanded and irrigable as estimated in Mr. Maconchy's report, page 124:—

		_
Area commanded,	Area of kharef irrigable,	Length of main distri- butaries.
Sq. miles.	Acres.	Miles.
i		
50	10,000	20
50	10,0 )0	12
100	20,000	32
	eomtwanded.  Sq. miles.  i  50	Eq. miles. Acres.  50 10,000  50 10,000

The storage amounting to 10,850 million outio feet, and the aren to be irrigated 20,000 acros, the allowance works out to a million cubic feet for every 2 were which is very ample. Mr. Maconchy considers it safe to count on a daty of 20 acres per million cubic feet, even after allowing for deterioration of reservoir, loss from leakage, otc. cost of the scheme, as estimated by Mr. Macouchy (page 125 of his report), is as follows:

Durgaoti schemo.	
Storago reservoir for 20 cores at	Rs.
Woir across Dorgacti, 1.000 feet at	6,00,000
High-level ranni from weir to Sassa- ram, 16 miles, at Rs. 15.625 per	2,00,000
mile Distributaries, 20,000 aores, at Rs. 12-8	2,50,000
par noro	2,50,000
Total works . ,	13,00,000
Establishment, Tools and Plant and Indirect Charges at 30 per cent.	8,90,000
Total Capital cost	16,92,000

Mr. J. H. Tongood.

Mr. J. II. Toogood.

The cost of the storage reservoir may be accepted. The weir, I do not think, it likely to be more than 500 feet across. The area to be irrigated is about the same on each 25 Oct. 02.

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Cost of works.		
Con of works.	Ks.	Rs.
Storago reservoir	6,00,000	•••
Weir, 500 feet, at Rs. 200 .	1,00,000	441
Main high-level canal, 16 miles, at Rs. 6,250 .	1,00,000	8,00,000
Branch canals, 16 miles, at Rs. 4,000	64,000	***
Minor distributaries, 20,000 acres, at Rs. 4	80,000	1,44,000
Total .	9,44,000	9,44,000
Preliminary exponses .	•••	25,000
Total works .	411	9,69,000
Add—30 per cent. Establishment and Tools and Plant and Indirect		
Charges, say	•••	2,91,000
Total Capital cost	• •••	12,60,000

Maintenance charges including revenue management based on the working of Sone Canals=34 per cont. on eapital cost of works, inclusive of establishment.

Maintenance.	_		_
	Rs.		Rs.
Three and one-third per cent. on cost of works,			
cent. on cost of works,			
viz ,	9,69,6	300=	=32,300
Revenue.			
20,000 acres, kharif, at Rs. 2	≥= .		40,000
8,000 nores, rabi, at Rs. 1-8	3= .	•	12,000
	Total		52,000

The net revenue in this case is Rs. 62,000-Rs. 32,300 = The net revenue in this case is us. 52,000—18. 52,000—18. 52,000—18. 19,700, which is equivalent to 1:56 per cent. on the total capital cost. These rates are low, and there is no reason why the rates obtained on the Sone Canals should not be realised in which case the revenue would ho—

			Rs.
20,000 acres, kharif, at Rs. 2-	8 ≠•		50,000
8,000 acres, rabi, at Rs. 2 =	•	•	16,000
	Total		66,000

The net revenue would then be Rs. 66,000—Rs. 32,300 = Re. 33,700, equivalent to 2.67 per cent. on the total capital cost. This project is, in my opinion, deserving of dotail investigation, as likely to be a good protective work, fulling within the scope of the projects indicated in paragraph 3 of Government of India Resolution No. 13—61-16 (Famine), dated 13th September 1901. Its investigation and construction (if found practicable) should follow that of the larger project of the Karmnassa. The net revenue would then be Rs. 66,000-Rs. 32,300 =

- 4. Provincial works .- There are none in this Circle.
- 5. Private irrigation works other than wells.
- (a) Brief description of such works (including field embankments) by whom constructed and controlled, state

of repairs, their liability to failure in a year of drought, obstacles, if any, to their extension.—Under this class in Bhabua and Sassiram Sub-divisions only the ahars em be reckoned. These consist of low retaining embankments constructed across the drainage lives of the country from shallow trenches dug above them forming shallow storage reservoirs from which water is let out by cuts or lifted on to the fields below. The fields them-elves are also bounded on all four sides by small earthen ridges, kiaris, 9 inches to 1 foot in height, which serve to regulate the flow and also to retain the required depth of water. They are generally of small area. The ahars are the property of the zamindars by whom they were constructed. They are either repaired by the zamindars or the villagers: in the former case the ramindars reimburse themselves by the higher rent they are able to reimburse themselves by the higher rent they are able to obtain from the lands which are watered from the ahars. An ahar, it is estimated, can irrigate from 3 to 6 times its An anar, it is estimated, can irrigate from 3 to 6 times its area. They vary much in size. In years of drought these ahars are more or less liable to fail and generally do so if the mins cease early in September, in which case the rice crop under them does not receive a watering in the hathia (1st half of October) and does not mature: ahars exist in nearly all villagers, the zumiodars and villagers being fully alive to their interests for the construction of these ahars.

- (b) Extent to which construction has been assisted by advances from Government concessions, if any, given to the constructors of such works.—In some few instances advances may have been given by Government under the Land Improvement Act, but not generally. I am not aware of any concessions being granted. On these points the Civil Department is better able to give information.
- (e) Obstacles to their extension and possibility of stimulating their construction in tracts liable to famine.—Their extension is not necessary in the tracts under consideration; they exist where necessary. The conflicting and rested interests of cultivators and camindars would probably be an obstsole to any extension of the
- (d) Can new works of this kind be constructed nithout the permission of Government or without reference to their possible effect in intercepting the supply to either Government or private works ?—I am not aware of any law by which the permission of Government is required in the case of the construction of a new ahar, and so far as I am aware, it may be constructed without reference to the possible effect it may have in intercepting the supply to other ahars; but this is a matter on which the Civil Department is also better able to give information as to ahar rights.

- (a) Districts or tracts in which well cultivation is (a) Districts or tracts in which well cultivation is most largely practised.—Throughout South Bihar wells are need for calivation of rabi, poppy, vegotables and augarcane, as these crops only require light irrigation. Rice requires too much water to be Irrigated from wells. In the tract in the Patna District lying between the East Indian Railway and the River Ganges between Bonkipore and Dinapore which is subjected to inundation from the Ganges floods, and thereby rendered fruitful, I helieve well cultivation is more largely practised than clowhere. Well cultivation is also resorted to in South Bihar in all tracts outside the canal areas. tracts outside the canal areas.
- (b) Averago depth of water below ground surface in each district or tract.—In Patna and Gya Districts about 20 to 30 feet. In Shahabad from 15 to 20 feet.
- (c) Cost of wells used for irrigation.—Wells are of two classes:—(1) Odinary earthen wells (kuañ) either without any protection (kutcha) or having hamboo or carthenware rings from which irrigation is effected with a single lover and bucket (lath). The great majority of wells are of this class. They are about 3 feet in diameter and cost from Rs. 4 to Rs. 16. (2) Masonry wells (laara) vary from 3 to 10 feet in diameter from which irrigation is effected with a leathern bucket (moth) and bullocks or several lovers and buckots. These wells are usually situated in or near village sites and are used by the village community for irrigation of adjoining lands. Cost of the smaller sizes, 3 to 4 feet diameter, vary from Rs. 60 to Rs. 100; 6 feet diameter, Rs. 150 to Rs. 200, and still larger ones from 300 up to 1,000, according to diameter and depth.
- (d) Average area irrigated per well.—This varies not only with the kind of erop grown, nature of soil and dopth of water below the sorface, but also depends on the personal industry of the cultivator and the area of land possessed by him.

The following table is from observations made by Colonel Heywood, R.E., and shows the quantity of water required or one age of the principal crops irrigated:—

No.	ome of	erop.		Number of irrigations.	Water omployed for trigation.	Total quantity of water required.
Wheat Barley Peas Gram Opium			•	3 2 to 3 1 7 to 8	C. ft. 6,800 6,800 6,800 6,800	C.ft, 20,400 20,400 20,400 6,800 47,600 to 54,400

From the small wells (kuań) ½ to 2 acros may be irrigated by one backet and lover. From the smaller masonry wells with a cauple of levers and buckets, or with one meth from 3 to 5 acros, nod from the larger wells working two moth as much as 10 or even 15 acres might be irrigated. The average area irrigated from wells is probably about built the above figures.

(c) Extent to which the supply of water is affected by drought.—The level of water remains fairly constant in ordinary years of drought except in the hot-weather months of April, May and Jone. At this period there is little or no coltivation except that of sugarcane.

(f) Concessions, if any, given to the constructors of new wells.—On this I have no reliable information; the Civil Department may be consulted. Probably in the years of drought advances have been made.

(g) Is it possible or desirable to stimulate the construction of new wells by more liberal advances or concessions?—As a general principle, I think it is better that the construction of the masonry wells should be left to, and devolve on, the zamiodars or landlords who might be encouraged by advances, recoverable in a certain term of years. For the construction of the common kacheha wells the cultivators can generally arrange, small sams, say, Re. 1 or Rs. 2 might be presented them in a year of extreme draught for the purpose of constructing them to save their crops; they seldom last more than a year. This is only desirable in tracts outside the cauni irrigated area.

Paragraph 7 .- Black cotton soil.

T (a) Where prevalent; usual depth; nature of the underlying stratum.—Black cotton sail, such as exists in the Bondbay Presidency and Central Provioces, is not found in Sauth Bihar, though there is a soil in the Chausa Pargana of Shahabad said to approach it. The clayey soils, which are more general and somewhat acologous to black cotton soil, now what are locally known as kenal and kerail. In the Gya District it extends clong both banks of the Punpun river in a varying width of from 5 to 10 miles, and this extends for a short length into the Patna District. In Shahabad it prevails in the west of Sassaram Sub-division and in the Bhabuo Sub-division north of the Grand Trank Read. It varies much in depth of a thiokness not less than 10 or 15 feet. The sub-soil is generally a yellow clay or loans.

(b) Is there any desire for irrigation on the part of the cultivators of such soil?—The desire for artificial irrigation is, I think, shown by the existence of ahars wherever their construction has been possible and likely to be bous-

ficial. Kewal lands are said to be best snited for rice and sngarcane, kerail binds for rabi, but in the canal irrigated areas, in many places, kerail lauda have been brought under rice cultivation when there is an assured supply of water ned an assurance of a profit equal to that of rabi. These lands formerly were recoved for rabi, as they retain moistore very well and produce the cold-weather crops with little or no irrigation.

(c) Extent to which the suitability of these soils for irrigation is affected by their depth and by the facilities for natural drainage affected by the stratum underlying them.—These soils being rotentive of moisture require but little irrigation, especially when their thickness is so much as in these South Bihar Districts, and there is but little, if any, vateral drainage into the sub-soil. Where the thickness of such soils is only from 18° to 2 feet in depth with ounderlying stratum of sud, as I noticed in North Champaian, frequent and heavy irrigation is noce-sary, otherwise the rice crops dry owing to the rapid natural drainage through the sandy sub-soil.

Paragraph 8.- Water-rates and distribution of water on Government work.

(a) Scale of water-rates on major and minor works.— The rates per nore current on the Sone Canals in 1902 are—

	Rø.	A.
Seron years' losse for block areas, all crops between 25th June of one year and 25th March of the next	2	8
Marif senson leases between 25th June and 25th October	3	8
Rubi season leases between 16th October nod 26th Murch following	2	0
Hot-weather season leases between 25th March and 25th June	4	8
Hot-weather season leasos between 25th March and 25th Jone for each wateriog	2	0
When water is available it is also sold by volume.		
Between 1st September and 31st October per calculated discharge of one cubic foot per second for 12 hours	4	0
Botween 1st November and 25th March following for filling ahars per one ochio		•
foot per second for 12 hours	1	0

(b) How is the distribution of water arranged for and controlled?—From the canals and distributaries the water is let out through permanent and temperary outlets icto village channels constructed by the people. The spening and closing of the outlets is controlled by and in the hands of the canal staff. The outlets are worked on the tatil or rotation system, being kept ten days open and five days closed. The size of outlets are now being based on a daty of from 50 to 60 acres per cubic feet per second according to the nature of the soil. From the village channel the cultivators arrange amongst themselves as regards the distribution of the water.

(c) Effect of years of favourable rainfall, the demand for irrigation and on irrigation revenue.—This is clearly exhibited in the following table, which gives the norea irrigated, minfall and receous for the past ten years. It is to be recollected that the rabi revenue is included in the following year to that in which the irrigation occurs:—

Test.	Kharii.	Rabi.	flot weather,	Total.	Ralofall,	Ap ess- ment or escence drinand,	Benarço,
1892-93	Acres. 274,839 280,528 258,301 261,485 316,941 299,061 304,778 805,464	Aores. 126,195 06,458 41,664 115,843 215,300 103,871 110,035	Acros. 9,727 10,700 17,109 18,304 22,825 31,013 25,993 26,331	Apres. 410,761 860,776 817,184 395,222 655,166 433,445 440,796	Inches. 87-69 46-62 59-65 58-46 80-59 63-59 63-74	Ra. 9,50,733 6,53,161 6,86,905 6,56,246 9,50,865 11,33,932 0,28,088 9,71,932	Below nverage, light in hathia.  Geod hathia.  Deficient in hathia.  Rains ceased early in Septembor.  Favourable. Fravourable, but none in hathia.  Deficient in transplanting season; no hathia min.
1900-1901 . 1901-1902 .	323,438 381,009	90,984 195,413	17,001 30,172	432,413 557,494	80·65 27·60	10,39,594 10,69,225	Heavy rain in hathia. No hathia rain.

Mr. J. H. Toogood. 25 Ost. 02. 25 Oct. 02.

Mr. J. H. The greatest fluctuations occur in the area of rabi Irrigated; the earlier the cresation of rains in September the larger the area irrigated.

9. Loans for improvements.—This information I have no means of ascertaining; it will no doubt be furnished by the Civil Department.

10. Programmes of relief works.

(a) Districts far which programmes have and have not been prepared.—Programmes of famine relief works have been prepared for all three districts of Patan, Gys and Shahabad; the statements have, I believe, been submitted to Government through the Commissioner of Patan, and they may be obtained and referred to for such information as is required by the Commission.

# APPENDIX A. Rainfall at Sassaram.

Year.	1	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nav.	Dec.	Jan.	Fab.	March.	Total.
1881-82 1882-83 1683-91 1884-85 1885-86 1886-87 1887-88 1888-89 1893-90 1891-93 1891-93 1891-93 1891-95 1895-97 1897-98 1899-1900 1900-1001 1901-1902		0°15 0°15 0°89  1°21 0°05 0°12 0°26  0°41 0°34 0°36 0°02	1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	######################################	17836 8 2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	1128 855 758 15-73 6-19 15-76 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26 11-26	20128876887688776857748788887888888888888888	963 621 313 770 443 103 077 021 560 447  344 027 018 256 119	1149  030 066 044  1113 110 016 1115	0°03 0°03 0°04 0°04 0°04 0°04	1'46 0'82 0'10 1'16 1'00 0'50 0'71 0'56 0'71 0'52 :::	0°03 0°66 0°03 0°81 0°81 0°81 0°83 1°20 0°65 1°33 1°20 0°65 0°05		40°57 37°15 25°68 35°18 41°29 34°16 34°17 41°16 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17 41°17
Total Average					***	***	, ,		***	•••	***	•••		879'47 41'68

# APPENDIX B. Rainfall at Bhabua.

Year.		April.	May.	June,	July,	Aug.	Sopt.	Oct.	Nov.	Dec.	Jan.	`Fab,	March.	Total.
881-82	-	0'03	2:00	5°40 5°62	9°16 10°78	15°52 15°43	0.12	2.79 8.75	1.89	•••	1.69	0.01	 0.20	37/39 46/35
882-8J 883-81	٠,	0.00	2.40	13.56	4.83	4.72	120	3.70		***		111	1 1	27:90
881-85			0.83	0.01	8.66	8:30	9.17	2.20	***	***	9.60	***	0.50	30.86
885-86	:1	- :::	1.52	3 39	5'13	1878	6.79	***		3 77	ŏ 10 l		1:52	41.29
886-87		***	1.86	7'72	16'67	8.41	7:07	8'49	0.30	0.18	1.27	***	0.55	53.68
887-88	. 1	0.62	8.13	3.03	10'17	14'40	4'81	4'95	.,	***	1'10	***	1 1	42.23
888-69		0:20	0::0	1.37	13'37	17'13	7'20	***	0.60	***	0'50	0.50	0'75	12:42
889-90	٠,		0.70	1.30	10.22	16.02	6'85	1.11	1'50	•••	***	227	0.35	33.6
890-91		144	****	0.76	12.55	10:58	7.01	0.31	***	***	1.20	0.87	0.4	. 41.1
891-93		0.01	0.32	1'14	5.26	16'61	5'51	0.46	•••	•••	0.43	2.33	***	32.48
892-93		•••	0.53	5'42	8.75	11'54	27.6	0'21		•••	0,40	2.01	0.24	. 32.0
833-91	٠١	0 02	1°86 0°82	7.96 6.10	17'65	9'14	15'20	4'10	1.15	W	0.63	0.20	0.11	£8°59
891-95	٠	0.03	0.37	636	12°33	16°10 9°28	5°02 5°22	10°77 0°23	2.83	003	. –		0.11	60°0
895-96 896-97	٠	0.12		7-92	6'53	936	1.03	•	1:30	0.41	***	i 21	0.54	29.7
897-98	•	019	•••	6'01	12 10	19.77	4'51	772			144	1.21	0.12	51.7
895-99	•		0.21	4.03	16.02	iris	8.45	0.18	***	0.02	1 27		1 1	45°3
899-1900	•	1 15	0.11	9.46	22.01	iii	2.93	0.02	***		2.05	0.45	) :::	50.4
200-1201	. 1		0.65	3.30	5'95	10'36	11.83	7.01	***	1.21	0.48	3.69	0.42	\$68
901-1003		***	0.12	•	5°15	12.10	13.60		•••		0.09	•••		81.0
Total			1			l		:		l	<b></b>			878*3
verage														41.8

# APPENDIX C.

#### Rainfall at Basawan

						Liain	jaii ai	Dasaice	171.					
Year.		April,	May.	Juna.	July.	Aug.	Sept.	Oct.	Nov.	Dea.	Jan,	Feb.	March	Tatal.
1881-83	-		2.22	4.61		17'30	3.20	5.15				•••	100	33*34
1882- 3	. [	- 1	0.80	4.82	8.10	2.30	9 10	7.60	1.70		1.52	•••	0.42	43°55
1883-81	•		0.20	8.25	8.28	2.52	8.12	0.00			***	•••	•••	29.63
1881-85	۰۱			5.63	4'75	11.80	375	5.22		[	0.40		0.30	2):09
885-96	.	}	2'30	2 10	5.20	14'76	9 35	0 05	•••	2.00	• • •	0.10	0.09	87.43
1886-87		1	0.10	2.22	16.03	7.70	7:50	510		0.40	1.20	•••	0.40	41.77
1887-88		1.27	6.50	2.45	3.42	15.75	3.02	4'05			1.37	•••	•••	87.97
18>5->9		0.10	0.50	3:30	763	21.62	6:59	0.11	0.42		0.16	1'30	0°36	43.65
1889-90			1.13	2.10	8'57	7'37	8.12	2.20	0.81		***	•••	0°41	37.00
1890-91		l l	0.13	8:67	12.21	9.85	9.17	0'73	***		2.61	6.62	0.02	45 16
1691-92	•	۱ ۱	0.13	2.11	3.02	12.17	2:13	0.57		•••	0.11	1.03	•••	23.18
1892 93		l I		4.82	13.03	10.83	4.00	1:11			0.23	2-22	0.42	36.23
1693-91			0.89	7.00	14.11	9.13	14.83	633	0.83	•0		1.11		51.23
1691-95		i i	0.16	6.23	12:15	17.05	***	13.80	1.01		0.81	0.61	0.10	59.06
1>95-96			0.31	6'37	19.00	6.33	8.36	0.41		0.02				41.46
1896-97		i I	0.09	5°37	4.78	5.00	0.03		0.70	0.51		1.12	0.66	19 93
1:97-93		0.13		3.39	10.00	19'55	5:37	615				1.15	0.02	45'61
189 -99			0.02	297	21.53	21.57	11'30	0'10		• • • • • • • • • • • • • • • • • • • •	1.11	0.07		58.69
189 -1900		0.30	0.51	12.12	2145	10'10	2'10				3.87	1.03	1	51.81
1900-1901		400		5.93	6.82	7.01	10'76	7.78		4'13	0.65	2 93	1.65	47'23
1901-1952		151	115	0.08	4 96	13.71	781				0.28	0.13	0.03	28 02
Total		l			١		l							84536
Avoraga	•		1	1	1	1	***							40 2
	•		***	***	•••	***	***		***			í	,	

Mr J. H. Toogood. 25 Oct. 03.

Statement showing the time of sowing and arriving at maturity of the princital crops grown in the trace of country traversed by the Sone Canals.

APPENDIX D.

				WHEN	HES BOWS.	When cur.	cur.	4		Number of waterings	
Description of erop.	English name.	Nattro name.	Sefentiflo name.	From	Ę.	From	5¢	Met naterlag required.		usually taken ta bring tha crop to maturity.	Bentaur,
Careals	Wheat	Gehun	TRITICOM TOLGARE (Fillore.)	. 15th October .	SPRING 20th Norembar	CEOPS. 184 March . 1	ith April .	Larty in November	Mid-December	ဗ	Water uscally required a fortnight alter awings.
		Chtras	PLYICCH MILICARY (Line.)	. 20th December	let May	ioth February. 16th Joao	•	Late la December	Erery fortnight	10	Three crops umally taken off. Water required a wesk after sowiog.
	Barley .	Jan	HORDRUM HREAUTICHOM (Linn.)	. Isth October .	20th December	20th 1	15th April	Eorly in Narember	Mtd-December		Weter untilly required a forlught after sowing.
	Oaks	Jai	ATENA SATIFA (Zébr.)	. 15th	dib.	20th ,, .2	25th	Estly in December	Mid-Janoary .	ູ່ຄ	
	Inferior rice	. Boro dhan	ORTZA VATITA (Lim.)	15th November	16th January .	lit Aprill .	Stat May .	Atways standing in water	1	:	
Sagercane.	Sogarcans .	UKP	. Saccuardu officiaaru (Ling.) , let February	let February .	31st March .	201h Norember 30th April	•	Md-February	Mid-April .	(1 before the	6 (i before the Water required two days aller rains, 2 after.) worther.
Palece .	Gran	Bant	CICRR ARETHUM (FFILM.)	. Isib October .	tsth December	tsih Febreary. Isih	•	Crustif sown and pairs or second crop in the rice- fields before the water has been drained our, after-	<u></u>	1	
	······	•	•	141	15tb Natember	10th	16th Namh .	wards no water is caudiy takes, kbough in sandy soil, khesari may require one ar two subsequent wateriags.			
	Peas	Khesari .	Latutada satitus (17711d.) .	15th	zoth	25th January .	loth	Mid-November	Mtd.December	n	•
		Maisr .	PISUM ARTRASS (Line,)	. loth Jone .	let Angust .	: ath	C. Hada diet	Not named a frefented.	<del></del>		
		Raber	CASANUS ENDICES (Spring.) .	10th October .	18th December	10th February .	Joh Merch . 5				
		Nastar .	ERVCM DIRECTED (HTHId.)	. 15th August .	1st November .	16th July &	15th August	Ditto		:	Distlognished as Karilka,
Dyes	· ladigo •	ж	. Indigorra zinctoria (Willd.)	lat Fehruary .	lat April	12th dial	16th	Mid-Februsry	End of March.	**	Dictinguished as Phagona or Junos. Water usually wanted a week after sawing.
	Safflawer	. Кишв .	Cantulanca tixerousius (Wills.) . 16th October	16th October .	15th November	15th November   16th February.   15th April	15th April .	Mid-November	Mtd-Decomber	n	Alvays sown with other crops as wheat, poppy, etc.
	Tarmerta	Hald .	CURCUMA LONGA (Zinn.) .	let May	16th July .	25th December	26th Mareb .	MIG-NIER	Mey	6	- 1
											<i>M</i> 2 2 5 2 5

Mr. J. H. Toogood.

25 Oct. 02.

APPENDIX D.

Statement showing the time of sowing and arriving at maturity of the principal crops grown in the track of country traversed by the Sone Canals.

amily taken to bring the error to bring the muturity.  3.  7. 8 or more					Warn	WREN SOWT.	WESN COT.	cor.			Number of	
Title	Description of		Native name.	Selentiffe name.	From	Ţ.	From	£	First watering required.	Jrrigation most necessary.	uanally taken to bring the erep to muturity.	Newson
Shelled   Fel   .   Spring along (R)   .   .   .   .   .   .   .   .   .		Lineecd .			16th October .	15th November	15th December	•	Not naugly frigated, and an a rule sown in rice-field, on u pairs or second crop.		•	-
Carlor   Rephy   Pol.   Registrat Countries (Fills)   Sub-June   Carlor   Sapara   Sub-June   Sub		Matard .	1961	•				•	Mid-November		n	
Conton   Kapta   Governov ministere (FFILL)   Lith June   Lith Larger   11th March   Lith April   Lith Apri		Castor .	ttern .		20th June	tet August .		•	Not neually trrigated		1	
Coling   Sapus   Colony   Coling   Colony   Co		Poppy	. Fo-ta .		h October	2015 November	1,th February.	•	•	Mid-February .	6 or more	Water usually wanted three days
Early rice   Tany rice   Thadel dian   Obving struct (Zing)   15th June   10th September 30th November 30th Nove	•	Cotton .		Gongrive nandern (Wills) .		talk July		18th April .			•	Seldom grown to the oren command-
Sajra   Particitable Particit						AUTUM	t Chops.					
Naiso	•	. Early rice	. Madel duan		15th June		10th September	30th November	Mid-Lady	•	•	As a rule, bowever, this crop is left to be matured by ratufall. It is not transplanted.
Maiso			Bajra	PRICILLIAL PRENTA	July			18th October .				Raldom excess middle the seas come
Maiso			Jowar .	Sondnow Vulging	toth June .		61h November .	15th December	•	•	•	manded by the Sone Capital
Julo   Paina   Concentrational (Fillid.)   19th 1.   20th 1.   18th 1.   1				. Zea Maxs (Line.)	æ	20th Juty .	13th Jaly .	16th October .			•	
Hemp . Sau . Corenavo closuciale (Willd.) . 10th February 31th March . 30th 3th September 31th January			Marga .	. CLAUSTRA CORACIAL (Gart.)		20th			Soot neugliy trrigated.	h	,	
Hemp . Sau Caotilally of Carteally of Sth September 314 Jaunary			. Patus .	. Concrete Caesulata (Will.) .	10th l'ebruary.	31st March .	•	35th December	See sugarenue, as this erop is usually town among it.			
WINTER CROPS.  Lateries . Kharif then . Ostzaelita (Ziav) 10th June 1st Laurer . 1st November . 1st Laurery . 3lid-June Early Ocieber . 7 or more		Hemp .	•	•	h June		33th Bentember	3ist January .		1	***	Seldom grown in the area commanded by the Sone County.
Kodo . Kada . Parlina secontrila (Zém.) 20th May . 31st July . 15th September 13th December . Tot more						WINTER	CHOPS.					
Koda Parrian seconcelica (Kim.) 20th Nisy . 31st July . 15th Sphember 15th Neember   Not usually trigated.  Vid Planacus accounted accounted (Kim.) 20th 30th 30th 30th Royamber 1tth Decomber   Not usually trigated.  Metht . Theorem . Theorem . Parameter (Wills) 20th 30th Reptember 2th November 2th November 2th November 2th November 2th November 2th November 3th Pabrary	•			. OSTZABLISTA (Zinv)	10th June		1st November.		Mid-June	Early October .		includes both transplanted and non-
Mun, Phanacus according 20th ., 30th ., 30th November   Not usually trigated,   Mun, Trigocus according 20th 20th November   10th Decomber   Not usually trigated,   Micht Trigocus arrangement of Trifid.) 30th August			Kodo .	. PASTALDM SCHOUTCULITUM (Linn.)	toth May	31st July .	15th September	15th December				transpianted fine.
Mins, . Pharmacus murco (Wills) 20th 21st 20th November 1 (th Decomber 1 Not usually trigated, (1870fd.)	•		Urld	٠	æ	:		301h November				-
Metht . Turnstand Dolicense university 20th disk dish Ociober . 15th			Man,	· PHARMOLUS MUNDO (IFIELD) .			20th Maramber	1tth Decomber	Not usually trrigated.			
Kurlit Doetcuos urronea (Willd.) . 30th Angust . 15th September 23th November 20th Johnsoo Todaco Tunsku Nivoriana (Lém.) . 15th Ociober . 15th November 15th Jounary . 16th Fabrary			Metht .				15th October .				• ~	
Tobacco Tumaku Nicoriana ranaccu (Liam, ) . 15th October . 16th Norember 15th Jonnary . 16th Febroary				. Dottous nivionus (WW.)		16th September	2515 November	20th	_			J
			Tumsku.	•		161h Norember	15th Jennary .	16th February		•	*******	Seldom grown in tho area communded by the Sone Canols.

C. H. DEMELLO,

Executive Engineer, Arrah Division.

# APPENDIX E

## RICE.

# APPENDIX F.

# Mr. J. H. Taogood. 25 Oct. 02.

#### · RABI (WHEAT).

Result of crop experiments from 1897-98 to 1901-1902.

Result of crop experiments from 1897-98 to 1901-1902.

•	Numbe of experi-		GUED DRY)	•	Number of experi-	AVERAGE :	
	ments.	Grain,	Situw.	•	ments.	Grain.	Straw
/1	2	3	4	. 1	2	3 ′	4
TABLE I.—Good "rice" crops irrigated with canal water.  [1897-98] [1898-99] [1890-1900] [1900-1901] [1901-1902]	24 20 39 29 79	Mds. s. 28 19 30 4 32 32 28 19 28 20	Mds. s. 53 2 46 35 68 12 55 31 48 0	Table I.—Good "rabi" crops irrigated with canal water.    1897-98   1898-99   1899-1900   1900-1901   1901-1902	15 10 4 4 10	Mds, s, 15 38 10 25 13 34 11 1 24 37	Mds. s. 19 15 27 14 20 26 19 9 29 30
Table II.—Average "ries" crops irrigated with canal water. [1897-98 1898-99] Sone Circle average [1899-1900] 1900-1901	86 101 93 98 88	22 67 22 3 22 30 21 28 20 86	47 28 33 38 38 3 34 9 36 0	Table II.—Average "rabi" erops irrigated with canal scater.  Sone Circle average   1897.98   1898.99   1899-1900   1900-1901   1901-1902	57 52 56 45 51	11 23 14 11 9 82 7 7 13 20	13 29 7 4 12 32 11 12 16 35
Table III.—Good "rice" crops irrigated without canal water. [1697-98] Sone Circle average [1899-1900] 1900-1901] 1901-1902	25 17 29 17 24	27 12 24 38 20 21 22 11 22 8	55 1 42 34 48 38 44 28 39 0	Table IA.—Good "rabi" crops ir rigated without canal water.  Sono Circlo averago 1899-1900 1900-1901 1901-1902	12 16 8 5 10	17 9 17 21 16 33 11 35 22 27	24 10 19 23 21 17 16 90 25 0
Table IV.—Average "rice" crops irrigated authout canal water.  [1897-98] [1898-99] [1898-1900] [1900-1901] [1901-1:02]	63 82	20 3 17 21 10 29 14 18 12 30	36 2 20 25 30 13 26 35 24 0	Table IIA.—Average "rabi" crops irrigated without canal scater.  Sone Circle average   1897.98   1899.1809   1800.1900   1900.1901   1901-1902	39 20 43 42 34	10 38 12 20 9 28 7 30 11 16	11 1 16 13 18 2 13 9 15 30

No. 4114, dated the 17th October 1902.

From—The Superintending Eugineer, Sone Circle,
To—The Chief Engineer, Bengal, Public Works
Department.

With reference to your No. 380-T.I. of the 18th ultimo, forwarding a copy of the replies, dated 17th February 1902, by C. E. A. W. Oldham, Esq., Collector of Gya, to the questions set by the Irrigation Commission and asking for the opinion of the Executive Engineer, Eastern Sono Division, and myself on his replies regarding pains and askars, especially paragraph 20 thereof, I have the honour to submit copy of the Executive Engineer's opinion as set forth in his letter No. 4621 of the 3rd instant.

- forth in his letter No. 4621 of the 3rd instant.

  2. The paragraphs which deal with pains and ahars are paragraphs 12 et seq. In paragraphs 12 and 13 the system of pains and ahars irrigation in the Gya District has been very fully and accurately described by Mr. Oldham, and 1 have nothing to add. The system of pains and ahars irrigation is, owing to the physical features of the district, peculiar and essential to it, and enables the cultivation of rice, the staple food of the people, by supplementing the rainfall, which is inadequate for the purpose: their existence is, therefore, of great famine protective value. They are managed, as stated, by the people among themselves without courted from Government and are maintained by the landlords, ordinary repairs being carried out by the cultivators themselves.
- 3. In regard to these works, Mr. Oldham states that the two most important directions in which legislative action is at present necessary aro—
  - (a) the provision of a masonry head-work to control

    the lovel at the entrance and regulate the
    inflow;

(b) the enforcement of the upkeep of existing pains in bhack tracis.

It is specially in respect of these proposals that my opinion, I believe, is asked. As regards (a), I am quite in accord with Mr. Oldham. A regulator at the head should be insisted upon, otherwise the main channel and course of the river is liable to be diverted down the pain, which gradually deepens and enlarges; this is more especially the case when the pain is cut in the angular bend of the river in the direction of the current. There are several examples of the effect of this; the principal one that comes to my mind is that of the "Panchamn" river, south of the tawn of Hihar, in which some 100 years or so sgo two pains of 10 feet width were taken off; these are now 100 feet and 300 feet in breadth, and the main stream of the river passes into them, the result being that below them in the bend and beyond the river bed has silted up and the river pay finds its way into the old channel in the higher floods. The people along the old bed have thus been deprived of their supply and now have no redress. Other instances, which have been brought to my netice, and on which I have been consulted, are on the "Mohnr" river near Tikari on the "Phalgu" and "Sakri" rivers. I mm also of opinion that the erection of bunds in the river beds should be prohibited, as undoubtedly they deprive villages lower down to a supply lo which they are legitimately entitled. In fact, legislation should extend to prohibiting any interference with the main rivers and streams of districts without the sanction of Government. As regards (b), once the pain is made, and a proper regulator constructed under sanction of Government, their upkeep and the distribution of water chould, I consider, be left as new to the people to man-go amongst themselves: too much grandmetherly legislation is not desirable or good for any people. I do not think it would be possible for

Mr. J. H.

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tered all over the district. Generally speaking, the landlords and oaltivators well knew the value of water for
oggicultural purposes, and I do not think ore blind to
carrying out what is to their advantage and interests in
regard to the nukeep of theso pains and ahars. In the
case of bhaols tennres, if the crop dies, landlords and
tenants suffer aliko, and if the landlords are indifferent
and extortionnte in the long run, they will suffer by their
tenants leaving their holdings. As a rule, I believe
landlords find it to their interest to help their tenants and
rotein them in their villages. rotein them in their villages.

4. In cases where it is considered necessary, I am of opinion that it is desirable that landlords and coltivators should be encouraged to maintain and construct these pains and alars by advances an liberal terms. New works should, of course, he professionally approved, and sanction then accorded by the district officer, who would decide on the amount of assistance that should be rendered and the terms on which it would be given.

No. 4621, dated the 3rd October 1902.

From-The Executive Engineer, Eastern Sone Division.

-The Superintending Engineer, Sone Circle.

With reference to your demi-official letter, dated 26th September 1902, forwarding Bengal Government No. 380-T.I., dated 18th idem, with enclosures (herewith returned), for an approximation of my opinion, I have the honour to report as follows :-

Mr. Oldham's replies to questions 1 to 11.—Agres very closely with the opinion furwarded by me to the Collector of Gya with my No. 74-R., dated 20th January 1902.

of Gya with my No. 74-K., dated 20th January 1902.

With reference to paragraphs 12 to 19.—Mr. Oldham has a much more intimute knowledge of the working of pains than I possess, as my datics do not take me much into the areas virigated under this system. I quite agree with Mr. Oldham in the concluding paragraph of his replr to question 12, in which he points out the necessity for some provision being made under which Government could force the landlords to maintain the pains in good order, and in the event of their failing to do so Government chould have the power to do the work for them and recover the cost from the landlords. from the landlords.

It is, in my opinion, impossible to cannlise any of the rivers in the Gya District efficiently, as the supply depends entirely on local mintall and ne water can be obtained in years of seasty rainfall. This is so. J. H. T.

These head-works would not provent sand entering the pains.

J. H. T. the damage referred to by Mr. Oldham is canced almost entirely by the want of proper head-worke to pains. If the supply could be regulated so as to keep out water during high floods, the quantity of sand brought into the pains would be comparatively harmlers. As, herevor, mone of the rivers in the Gyn District, with the exception of the Ponpun, have any direct outful into the Ganges, all the sand brought down by these rivers must eventually find its way on to the fields and all the sand kept out of pains in the opper reaches must be doposited semewhere lowar down.

1. Q. (The President.)—How long have you been Su-perintending Engineer of the Sone Circle?—Five years. 2. Q. And, as I know, you have hed long experience hero hefore.—Yes, as Assistant Eugineer and Executive Engi-

3. Q. We have had ample evidence that the irrigation here

is extremely popular, as popular as I have seen anywhere.

4. Q. I understand that the whole supply that you can count upon in the hathia is employed.—Certainly.

5. Q. In evary year?—Not overy year. In 1899 the sapply of water fell below, and if we had had to supply water to a larger area, we should not have been able to do so.

- 6. Q. The hathia is a period of about 15 days?—Yes, generally from the 26th of September to the 10th of October.
- 7. Q. Could you in a year, when the supply failed, say to the raiyats—" We cannot give it to you in 15 days, but we can give it to you in 22 days "?—That was what practically happened in 1899.
- 8. Q. Were they much worse off?-I don't think they

Paragraph 20.—I quite agree with Mr. Oldham in his remarks on the ovils of the bhaols system, but I am decidedly of opinion that it would not benefit the tenants

decidedly of opinion that it would not benefit the tenants for Government to take over the entire control and management in the pains. These channels are so namerous and the country so difficult to get about in that their management would necessitate a very large namber of subordinate officials with the attendant evils. A very large increase in supervising officers would also be required to keep a check on the subordinates. On the whole, the fax on the tenant would really be heavier than it is now. Under the present system the interests of landlord and tenant are really identical, and if the landlord could be brought to see this, the division of the crop being brought under control, the present system would, I think, he the most suitable for the district.

I quite agree with Mr. Oldham in considering that it is very necessary that proper head-works should be constructed for all pains and that the maintenance of pains in proper order should be enforced. The question of the prevention of bunds across the rivers is a mora difficult one. The supply of water in all the rivers in years of scanty rainfall is not sufficient for all, and the need of water is a worse that it would remain an armed force to reserve is so great that it would require an armed force to prevent the cultivators making a bund ocross a river when they saw their own crops dying and water going past which could save them.

In October 1899-1900 when the supply in the Sane failed it was found necessary to employ a comparatively large police force to prevent the banks of the Patin Casal and its distributaries heing cut. The difficulty would be very much increased in the case of pains which are scattered all over the district and are in many cases difficult of necess.

over the district and are in many cases difficult of necess.

I have already stated that I do not consider that canalisation of any of the Gya rivers is desirable; the Puapun is in some respects an exception. It is a perennisl stress with well defined banks and carries a fair discharge even in year of drought. At present bunds are made at various points in its course both in Gys and Patna Districts, and when the rains fail a large area is irrigated from it. It would be possible and perhaps desirable to regulate these bunds and in some places feed canals, almostry were and perhaps desirable to regulate these bunds and in some places feed canals. Masonry were and permanent head-works would be carried out and worker required, as the cost of temporary

The river is very wide and aballow, and I do not think the scheme soggested could be carried out and worked except at a prohibility cost. J. H. T.

required, as the cost of temporary bunds is high and they cannot be made until the river falls very

Paragraphs 21 and 22.- I ogree in general with Mr. Oldham's remarks.

D.-TANES. Paragraph 23.—The construction and maintenance of ahars is, in my opinion, best left as it is. The landlords and caltivators understand the principles under which they can be worked satisfactorily. By

l quite agree. these means a large quantity of water is stored for future use, and J. H. T. given good rain in Angust and at the end of September, the erop dependent on them is assured. The lands on which ahars are used could not easily be irrigated in any other

way.

Paragraphs 24 to 33.-I agree with Mr. Oldham's opinion.

- 9. Q. Did they ory out for remissions? Did you grant them remissions !-No. We gave remissions where the crop fell below a certain avorage.
- 10. Q. During the whole season there are periods when there is more water than is actually wanted, even the hathic?—There are periods in which we have more water than is required.
- 11. Q. Would it he worth while to take measures for increasing the supply of the cannis for that time?—I am efraid the expense would be probibitive.
- 12. Q. I should like to know whether you could ant down the walls of your weirs so as to erents greater velocity?—
  It would cost a certain amount of money, but it might ha worth it. It might damage navigation, but that would be immuterial.
- 13. Q. Is it n thing that has come before you?-I have thought of it.
- 14. Q. I understand that the extreme pressare at the time of the hathia is due to the draining off of the whole rice-fields just before ?—Yes.

- 15. Q. Cauld you to any advantage arrange to fill ahars just before, sey, in the first week of September ?—We could fill the ahars, but it would affect the irrigation. I fancy if we went in for that system the leases would decrease. I dou't see how you could quite make an essessment.
  - 16. Q. (Mr. Muir-Mackenzie.)—Is there not enough water to supply the leaves and to fill the ahars as well f-There weald be at times.
- 17. Q. (The President.)—Could one use the ahars as supplementary storage busins ?—Of course where the whole block or all the lands below the ahars were under leases there would be no harm in filling the ahars when we are -spilling wutor.
- 18. In September you are spilling water ?-Generally no ure.
- 19. Q. You think the difficulty would be about assessment?—Yes. Some of these ahars are connected one with another, and they would probably pass on the water to unleased lands.
- 20. Q. Is there inside the field of irrigation a considerable amount of water supplied to louds which do not pay any canal rates!—There is. We try to prevent the ahars being filled from the canals except at certain times when water is given at fixed rates, but there is always u lot of malpractices in the way of water being taken into unleased lands.
- 21. Q. If these malpractices mean wastage of water, they are malpractices. If they mean merely a question of dithently of usessment, would not you wish to got rid of that difficulty somehow? For instance, could not the difficulty he got over so as to store and utilize water, the ahars being used as reservoirs?—If all the lands were leased, of course there would be no objection whatever; but of course there would be no objection whatever; but of course there was a supplied that a supplied the ahars.
- 22. Q. (Mr. Rajaratna Mudaliar.)-Might the akars be filled by arranging for lump payments from the zamindars?—You would have to select your alars for that purpose. You might do it that way. It is possible.
- 29. Q. (The President.)-You say the sugaroane oultivation has been doubled since the construction of the Sone Canals: Its area is limited to the hot weather supply ?—Yes.
- 24. Q. You mean the supply before the mins?—dust before the rains. The hot weather season ends with the 25th of June.
- 26. Q. What are you irrigating besides sugarcane then? -Sugarcane is the principal crop; there is a little indige also.
- 26. Q. Do you practically take every drop of unter you can for sugarcane?—We are often very lard pressed indeed for the sugarcane. In fact, the custern main system has often to be closed owing to dearth of water in the hot weather, i.e., from the 20th of April; the water we let
- 27. Q. We found eleewhere a very considerable system of supplementing canal irrigation and tank irrigation by wells?—You see here the staple food of the district is rice and that rannot be irrigated by wells,
- 28. Q. I mean for crops like sugarcane?—Thor do irrigate a little sugarcane in places from wells; in the Blubon Sub-division I have seen a large plot of sugercane irriguted from a well.
- 29. Q. They would not think of helping ental irrigation by irrigation wells ?- I don't think so.
- 30. Q. What is your hot weather supply ?—It goes down to about 600 or 700 oneces.
- 31. Q. There has been no question of storage in the valley of the Sone, hus there P—No; I don't think there is any project, unless you take these smaller irrigation streams in Chota Nagpar. They are on the tributaries of the Sone.
- 32. Q. I suppose you have not much occasion to go into Bhubuu f.—I have to visit Bhabuu; I mean just going by rull-way to Bhubua, but I have not travelled about much within the Bhabus Sab-division.
- 33. Q. You were here before the irrigation by the Sone Canals began. Is Bhabua very much in the same state as this part was before it came under irrigation?—I think Bhabua is very much worse than the Shahabad tracts were
- 34. Q. (Mr. Muir-Mackensic.) What did these depend on then ? Ahars principally.

- 35. Q. Shehehad is very much like Gyn?—Totally different. It is a flatter country. Gyn is an undulcting country. It (Gyn) is like parts of Mudras.
- sidered, and here we are met by the difficulty that the Kanamaussa traverses the western and northern portions of Kalammess traverses the western and northern portions of the district concerned, so that the bulk of the storage is unsuitably placed for corresponce to the affected tracts. He also goes on to say:—"The only solution to the difficulty oppears to be to construct a high-level canel, taking off from n weir, to be constructed as close as practicable to the point where the Karammassa emerges from the hills (soy, at about the level of the 270' or 280' content) and running nearly due cast for about 36 miles, falling gradually to about the 250' content at the point where it would meet the Kudra river." Could you not take u canel from the bettom of it b—Those recognizes are the least of the storage recognizes are the least of the storage recognizes are the least of the storage recognizes are the least of the storage recognizes are the least of the storage recognizes are the least of the storage recognizes are the least of the storage recognizes are the least of the storage recognizes are the least of the storage recognizes are the least of the storage recognizes are the storage recognized and the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are the storage recognized are bottom of it?—Those reservoirs are too high up the river for a canal to be taken direct from them. The reservoirs are wery high, and there is a water-fall of 175 feet below their proposed sites.
- 37. Q. Then the river itself would be made to carry ater?—The reservoirs would held the water and the river would be used to carry it to a weir lower down.
- 38. Q. I suppose you think it would be the right thing to thrash out time Karamunasa project and have it properly surveyed?—Most decidedly.
- 39. Q. Have you means in the way of officers for undertaking it?—I have not. It certainly requires a special man and a good man.
- 40. Q. Has the Province got the means?-Mr. Horn would be able to state that.
  - 41. Mr. Morn-I think we could get it done.
- 42 Q. (The President.)-You heard Mr. Rajaratuu's examination just now. Can you give us information as to what the cost per acro is for the beasurements?—It has all been most carefully worked ont in this book. It comes to about 5½ annas per acre. I think the Deputy Collector's establishment costs between Rs. 60,000 and Rs. 70,000 in year. The cost of measurement and collection are nearly equal—helween 7 and 8 per cent each. At present the cost of measurement and collection are nearly half-and-half.
- 43. Q. That is, 15 per cent, both for measurement and coil ction ?-About tlint.
- 11. Q Are you satisfied with the way that the contract system works ?—I am quite satisfied : it is very good.
- 45. Q. It does not lend to any waste of water : want of economy of water ?-It is minimised.
- 46. Q. Do you look after the village channels?-Yes, they are under us. They are paid for hy the villagers and ramindars, but they are under our supervision, and we can entorce their repairs under section 60 of the Canals Act.
- 47. Q Are you satisfied that the period of loven years is a saitable one for leases?—I think it is about the limit it
- 48. Q. You think it shoold not be longer !- I certainly don't think it should be longer. People die, and you find many changes in seven years.
- 49. Q. Have you any suggestions which you would like to bring before the Commission as regards the points before it?—I don't think so. I don't think there is anything.
- 50. Q. Have you found here my demand for drainuge accompanying irrigation !- That was so some years ago, just after the irrigation commoneed on the Sone Canals and a large number of drainages were carried out.
  - 51. Q. You have a number of drainago channels ?- Yes.
- 52. Q. (Sir Thomas Higham.)—As regards these questions of measurement, I understand you have very little measurement to do in the Sone Canals ?—A great deal of measurement has to be done. Blocks have to be measured when you give u leaso.
- 53. Q. After you have given the lease you don't menfield have taken water and which have not f-No. Wo nesume all has been watered. A mun is liable whether he takes or does not take the nater.
- 54. Q. What is the use of your measurement staff?—We have to rotain a certain number, because in one year a cortain number of leases lapso.
- 65. Q. Your measurements are not only on the applications for long leases, but subsequently for the rabi oud peronnial crops !- Yes.

Mr. J. H. Toogood,

Mr. J. H. Toogood. 25 Oct. 02.

- 56. Q. Thr. Muir-Mackenzie.)—Also far the scaen leases?—They are generally measured up about the time the applications are made; sometimes before, sometimes after. We try to measure them up before we grant the leases. The kharif eason leases are in blocks.
- 57. Q. Could you tell us something about these blocks; what are the sizes of these blocks?—They vary very much. We have some 40 bighas or 25 acres. That is the smallest block. The rule is nothing less than 50 acres is leased. Some villages have 800 ar 900 or 1,000 acres, perhaps more.
- 58. Q. I suppose you never have a block divided between two villages ?—Sometimes we add a small area in one village to a larger block in another.
  - 59. Q. For convenience ?-Yes.
  - 60. Q. As a rule, the block is village by village !-Yes.
- 61. Q. But you may have more than one block in a village?—Yes. We have more than one block; sometimes two at three blocks. However, I am trying to get them, so that all the lenses expire simultaneously.
- 62. Q. Snpposing some of the owners in those blooks do not want water. What happens?—If they do not all agree, that is to say, if a very small percentage is left aut, we give in and grant a lease. But it must be a very small percentage. We generally wait till they all agree.
- 63. Q. If they do not all agree, you do not give a lease?— Wo do not unless there are a very few left aut, and if there are a few, we try and catch them. We keep a watch on those who are left out. They have our special regard.
- 64. Q. That means an establishment?—Yes. Patrols go round to laok after them.
- 65. Q. Then what do you do in regard to remissions?

  -No remissions can be granted an long lease lands, except specially under the Superintending Eugineer's orders.
- 66. Q. On what greeneds does he grant that?—If the field has been left unonltivated, he might grant it, or if the man has bolted.
- 67. Q. If the water has been available and the man does not take it, do you grant him remission?—Very mrely. I thick in the last three years about Rs. 13 has been granted.
- 68. Q. Have you no claims for remission on the ground that the enpply was not sufficient ar regular enough?—We have had no such complaints.
  - 69. Q. You nover give remissions on that ground ?—No.
- 70. Q. You never have nuplications for remission an account of irregular emply ?—Wo may have had, but there have been very few complaints.
- 71. Q. Then practically yan give no ramissions?—None an the long leases.
- 73. Q. (Mr. Mair-Mackenzie.)—But yan do on tho season leases?—Yes, we do on season leases, but not on kharif season leases.
- 73. Q. (Sir Thomas Higham.)—Season leases are not entitled to water until lang leases have and theirs?—Generally we look after the supply to the long leases first.
  - 74. Q. A long lease has a preferential claim?—Yes.
- 75. Q. Therefore season leases might have a short supply?—Well, I don't recollect any cases.
- 76. Q. If there was a short supply, would you give remissions ?—We don't give remissions generally in block area, and the season kharif leases are block areas.
  - 77. Q. In rabi yan give remissions?-Yes.
  - 78. Q. And perennial?-Yes.
- 79. Q. Oo account of short enpply?-It is generally failure of crop.
- 80. Q. From whatever causes?—It is generally not due to our short supply.
- 81. Q. Supposing crops were eaten up by locnets, would you give remissions for that ?— We have done so.
- 82. Q. You don't make a regular practice of it ?-No.
- · 83. Q. What is the eystem of rotation in giving water? Is it given continuously to the people?—For ten days they get water constentively, and then for five days they are shut off, and so on.
- 81. Q. That is the practice?—On the Patna side they have 12 and 4 days respectively. We shall probably reduce that to 10 and 5 days respectively. Ten and 5 days is the general system.
- 95. Q. (The President.)—What percentage of the lands pre watered as n rule?—No. Fifty per cent. is what we

- limit correlves to a certain extent, but we do go up to 80 or 90 per cout. in a small village.
- S6. Q. Theoretically you irrigate about 50 per cenf. F-Yes, so us to distribute the benefits of the water more evenly throughout.
- 87. Q. (Sir Thomas Higham.)—Then I understand your capsoity is limited by what you can do in the first 15 days at October?—Yes, they must have water for the rice crop during that period.
- 88. Q. Both the late rice and the early rice?—Not the early rice. For the early rice they don't want the water; for the late rice they want it.
- 89. Q. In Maconchy's book he says that the duties are based on the total kharif nrea, not an the late rice area P-Yes, but the area of early rice is a very small proportion.
- 90. Q. The only time you have really fallon short in the hathia was in 1890?—Yes, in October 1899.
- 91. Q. What is the maximum supply of the canals?—4,500 ousces in the main western system and 1,850 cusecs in the main eastern system.
- 92. Q. What did you do in 1899?—I distributed the supply between the three main branches.
- 93. Q. The three main branches are?—The Patna, Arrah and Buxar. The water was distributed between them according to area leased.
- 91. Q. Now you are refusing leases on accenat of the experionre of that year?—To a certain extent we are refusing leases on account of the limited expectly of our canals. The capacity of our canals is only 6,350 ousces.
- 95. Q. In 1899 yon say you refused applications for 40,000 nores?—Yes. That is, where it was beyond our kharif limit, we could not extend the water there. Our canals only carry 6,350 casees.
- 96. Q. That is because you have not got the water f-
- 97. Q. The irrigation for large areas has naturally to be reduced when there is a want of water? -Yos, and we have not got the water. We cannot carry more than 6,350 casess. If you take 6,350 cubic fest and multiply it by 60, that gives ubout 360,000 acres.
- 98. Q. You can novor do wore than 360,000 in the kharif area?—I don't think so, unless we increase our carrying capacity, and we must also consider the water wanted in the hathia.
- 99. Q. You are limited by the water wanted in the hathia!—Yes; by the amount of water we can give during the hathia.
- 100. Q. What do you call the hathia, 15 days in October?—Fifteen days. It is a lunar asterism.
- 101. Q. Csnnot it be strotched?—I have already said I think it can. I think in 1899 we practically did stretch it. It is the only year we probably did stretch it, but I think it affected the crop. I told the people distinctly that year when they came and crowded round my compound—"If you use the water carefully, you will get a very fair crop; you will not get a full 16-anna crop, but you will get 14-anna.

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- 102. Q. You did not give many remissions?—No. We gave certain remissions, if they had a very had erop.
- 103. Q. When leases fall, are they invoriably renowed or is there any difficulty in doing so f—The people are always eager to renow them. They never let them drop, not if they can balpit. We generally refuse those who will not comply with our conditions of making proper boundaries, improving their village channels, etc.
- 104. Q. Thon if you have got so many applications, I suppose you have a strong hand?—Yes, we have. The rayats are very loth to lose a lease.
- 105. Q. The area that lapsed this year was 36,000?—Yes, nod the total area applied for was 141,000.
- 106. Q. Have youn perfectly free hand in refusing ar renewing a leave?—Yes.
- 107. Q. If a man has had a lease for soven years, could you say "we won't give it to you?"—If he does not comply with our conditions. Now water is so valuable here, people are eager to get it, and if they don't comply with the conditions, we do refuse them.
- 103. Q. Bat if they comply with the conditions, you don't refuse?—Wo never refuse.
  - 109. Q. Havo they any rights !- I don't think so.

- 110. Q. You do refuso them now and agoin?-Yes, we have refused them.
  - 111. Q. When were the mtcs last rovised P—The former rates expired in 1895-96 and were then revised.
    - 112. Q. Were they raised then?-Yes.
  - 113. Q. Is there any legal objection to their being mised at any time?—None whatever,
- 114. Q. Thon it is a matter of supply and demand?—ust so. It is a matter of supply and demand; and also the benefits that the cultivators get from irrigation ; I mean .tho extra produce they get.
- 115. Q. Supposing you said that instead of charging Re. 2-8 for the long system leases, you would charge Rs. 3, there is nothing to provent your doing that?—No. I think there is every reason for us to do so.
  - 116. Q. It is now seven years since the rates were last wired ? To when does the present rate extend?—Up to March 190 i.
- 117. Q. Is there any question of raising them then ?--
- 118. Q. (Mr. ) fuir-Mackenzie.)—You cannot raise the rates in the middle of the lease  $^p$ —No.
- 119. Q. (Sir Thomas Higham.)-How far does Government deliver water? Does it deliver it into each block?-Government delivers water up to each block. We attrying to get the channell extended well into the blocks.
- 12). Q. The Government channels ?-We have no Government channels; they are all private channels.
- 121. Q. You have distributaries !- Yes, and they are Government channels.
- 122. Q. Do these distributaries go into the villages ?-No.
- 133. Q. Is water brought into the edge of overy village?
- 131. Q. And the village channels may have to pass through another village?—Very often, and no have to against the laud for these channels. Generally the people gire the lands where the channel is in their own village. They can arrange this aroong themselves; if unt, we nequire the land under the Act. the land under the Act.
- 125. Q. Do you pay for the land?—Yes. The applicant for the village channel has to deposit the mency in the Executive Engineer's office before any preliminary oction is
- 126. Q. Do you buy the landf-Yes. We take up the land under the Land Acquisition Act.
- 127. Q. Is there may objection ?— Yes, they always want the channel to go another way. They always want to save their own lands and put it in their neighbours.
- 138. Q. What is the length of those water-courses?-We limit them to 2 miles.
- 129. Q. What do you mean?—We don't allow them to go more than 2 miles from the distributaries.
- 130. Q. If they want to go further, do you make another distributory P—As we have not get the water, I:throw out thuse applications, because lots of our distributaries run dry duting the kharif seasou.
- 131. Q. Does much waste go on in these water-courses?
  —There is not much waste, but there is a certain amount of waste, because some of the older channels are not in excellent order, and then again every year channels are damaged, because each man gives the channel a out with his kodati and gradually the channels get into had order, so that it is necessary after the seven years to be more particular that the channels should be brought into repair.
- 132. Q. Before you renew your leases you enu insist on the repairs !- Yes, that is one of the points that I insist upon. I am very particular about that.
- 133. Q. (Mr. Muir-Mackenzic.)-With the irrigation 183. Q. (Mr. Mair-Mackensic.)—With the irrigation so repular and the demand for water so keen, why is it that the anticipations as to the revenue likely to be realised on the Sone Conals have been disappointing? Is it because the canal has not carried as much water as you expected?—Well, first of all, the duty is much sundler than was expected, and then again the navigation has not come up to auticipations. Another reusen is that the anticipations were made upon the large rabis cultivation which has not corneral. which has not occurred.
- 184. Q. You don't think you could increase the rabi oultiration by lowering the rates temperarily? - I would mise the rate, because what has happened is exclusion of the rabi lands within the long leased blocks. They have all,

- as far as possible, been converted into rice lands, and there is no rabi exclusively sown on them.

  The agents of the converted into rice lands, and there is no rabi exclusively sown on them.
- 135. Q. Still I don't understand why you would raise the rabi mtes?—There is generally enough moisture in these lands in ordinary years, so they are not leased except in
- 136. Q. You don't think, if you lowered the rabi rates, they would be inclined to take water?—I doubt whether the leased area of rabi would increase.
- 137. Q. Do you find that the value of land has increased very much ?—From all I hear rents have very consideraby inercased.
- 138. Q. You know instances where rentals have considerably increased?—There is a very interesting paper on that subject by Mr. Lusen. I have it here.
- 139. Q. At any rate it is your belief that the value of land has very largely increased. Rentals have also increased, have they not?—Yes.
- 140. Q. Even where the system of rentals is cash?-Yes, even in the eash rentals.
- 141. Q. Do you know how the laudlerd manages that in opice of the Tennucy Act?—I have heard laudlerds express the view that they can drive a carriage and pair through the Tenancy Act.
- 142. Q. (Mr. Rajaratna Mudaliar.)-Even in the case of occupancy tonants ?- I believe so.
- 143. Q. (Mr. Muir-Mackenzie.)—The tenants find it hest to keep on good terms with their landlords?—Yes. There is a sort of mutual self-help society between the landlords and tenants. There is no doubt landlords do a great deal of good in times when the raigats are in want.
- 144. Q. You don't think that when the landlords' slurce have been increased in value that it would be advisable to take an owner's rate from the landlords ?—There would be very great objections to it on the part of the imidlords. That ought to have been done in the first instence. I don't think it would be advisable to attempt it univ.
- 145. Q. Recause of the objections that would be raised? -Yis, although it would be quite justifiable to do so.
- 146. Q. (Mr. Rajaratna Mudaliar.)—You said that Shahabad was chiefly dependent on ahars before the cauel was constructed?—Yes.
- 147. Q. Did the construction of the canal interfere with the old sources of irrigation?—No. They got the same drainage water into them as before, except perhaps from that little strip occupied by the canal.
- 148. Q. Are there no cases in which the canal interfored?—There may be end or two cases; I don't recollect any. I daresay there might have been where the canal took up an ahar itself. I think you will see that in Mr. Luson's note also.
- 149. Q. (The President.)-A note prepared for the Government?-Yes.
- 150. Q. (Mr. Rajaratna Mudaliar.)—In such cases you supplied the water displaced by the canal?—I think in most of them. The lands alongside the canal are nearly all leased.
- 151. Q. Where the old sources were interfered with, what do you do to compensate the zamindar? Do you samply water to the old irrigated lands?—Of course we do. As I eny, we are supplying it to those villages alongside the canal which we interfered with.
- 152. Q. You supply water free th such lands ?- Cortainly not free.
- 153. Q. I find from some papers that water is supplied free from the Madhubani Canal ?—Yes. That was construgted by a zamindar, and then afterwards bought.
  - 164. Q. Is that in your jurisdiction?-It used to be.
- 155. Q. Why is water supplied free theref-You had better read the papers in the case; it is not in my jurisdiction
- 158. Q. Do you see any objection to the wark of measurement and collection being done by one and the same staff? —I think one is a check upon the other. It would be most underirable to have both done by the same staff. It is now dono independently by the two parties, and one is a olicok upon the other.
- 157. Q. Could may saving be effected if the work were dous by one and the same staff?—It could be done, but there will be no saving of staff. At present you might say the one is a sort of check upon the other. If the same

Toogood.

Mr. J. H. man measures and makes out bills, the whole thing is in Toogood. his hoads and there can be no check over him.

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- 168. Q. (Mr. Muir-Mackenzie.)—I want to ask you once again about the rabi oreo. Would not the cultivator, who now hesitates to take woter, readily take it if the naterrates were luwered, say, in o season of good rainfall?—I do not think it would be a good thing to have a varying rate for the good and bad seasons. I think the rates are quite for the good and bad seasons. I think the rates are quite low enough now. I hove recommended an increase of the
- 159. Q. What is it here?—Here the rate is Rs. 2 an acre for rabi.
- 169. Q. Another thing I wanted to ask you about was with reference to compliance with a larger number of applications for losses. I understand that the number of applications complied with is limited to the amount of water supplied during the hathia?—Yes.
- 161. Q. Do you think it would not pay hetter to risk the supply running short in the hathle and grant remissions for failure of crop or for injury done, and to comply with the larger number of opplications?—There would be enormous difficulty.
- 163. Q. This rarely happens f.—I do not say it rarely happens. It happened in 1890, and though I do not say it will happen in this year, it may. The river is beginning to
- 163. Q. (The President.)—You have passed the hathia, have you not?—Yes.
- 164. Q. (Mr. Mair-Mackensie.)—Then in 1899 you have told us that the cultivators did contrive to husband the water, and saved a gnod deal of their erop; they got their 14-nnna and did not apply for remission f—Yes.
- 165. Q. Even if you had granted o few more explications it would have been consistent with giving a full supply through the hathia?—Yes, but the people would not welcome that system. A rayat would rather have his crop than his remission.

106. Q. Yondo not think it would be worth while to run a cartain risk?—No, I do not think so. We might get up to \$60,000 or 400,000, but I doubt if we will go beyond

167. Q. (The President.)—Can you give me any idea how much the capital account of the cannis less increased by the splendid provision made for unvigation ?—I saypose about 50 lakks on about 275 lakks.

168. Q. That is about 20 per cent. ?—Yes. The navigation works were very expensive and their maintenance is very expensive now.

169. Q. Did the navigation ever fulfil at all what was hoped it would before the railway came into these parts?—Never hefore the railway. Doring the railway construction we got up to the amount stated by Colonel Dickens by carrying their materials. We never had a large amount of traffic except when the railway was being made.

170. Q. Is it oppreciated as n boon ?—I think the people appreciate the steamer corvice on the canals. It is still going on.

171. Q. Was it at all in the district appreciated as a thing worth making a sacrifice for ?—I think so. The steamers appear to run full. The geutleman who has bought the steamers and has hired them is reported to he a wealthy

172. Q Has it done much good in the country os regards country boats? I think it has done some good, but it has often to be sacrificed to the interest of intigution. There is sometimes unt enough water for both.

173. Q. It is killed now? - Well, I nm told that the steamer traffic is killing the boats altogether, because the firm have reduced their rates.

174 Q I did not know there were ony steamers on the cands?—Two steamers.

175. Q. Don't they cut up the banks !- I don't think

WIRKES No. 17 .- Ma. W. S. BREMNER, Executive Engineer, Eastern Sone Division.

(Replies to printed questions.)

A.

1. The Buxar and part of Sasteram Sub-divisions in Shahabad and the portion of Gya and Patan Districts situated between the Poon Poon and Some Rivers. Mr. W. S. Bremner.

25 Oct. 02.

I have been for four years Sub-divisional Canol Officer at Sikronl in Buxar Division and for three years in charge of the Eastern Sone Division of the Sone Canals.

2. See statement.

- 7. (1) It is possible to grow a second (paira) erap on almost all rice lands with the help of canal water. This can only be done in exceptional cases. The actual cash increase in value is about its. 8 per acre In addition to this, the pulse crop has a beneficial effect in introdocing nitrogon into the soil.
- (2) The use of canal water permits the substitution of rice for rabi crop to a considerable extent where water is available. During the hot wenther a much larger area of sugarcane can be grown than would be possible without it.
- (3) (a) In a year of ample rainfoll the use of canal water only increases the yield of rice crops, and that not to any very great extent. On average land, however, even in a year of emple rainfall, canal water is useful in enabling the caltivators to plant the seeds, transplant, and drain his lands at the right time. The draining of rice-fields in the utranichatra (middle of September) is of great benefit to the crop.

In a year of ample minfoll the neo of canal water increases the yield on rice hods by abent 10 per cent.

(b) In a year of scanty rainfull canal water is almost indispensable. Without it the orop suffers badly of each break in the rain, and agricultural operations cannot be carried on at the right time. The use of canal water in such a year increases the outturn of rice hande about 30 per cent, on the average. per cent. on the average.

(o) In a year of drought const water is indispensile; no ries can be grown without it, and rabi crop cannot be sown on about 50 per cent. of the area.

In a year of dronght canel water increases the yield of rice lands about 200 per cent., that is, a normal crop can be obtained instead of 30 to 40 per cent. of the normal. On

rati lands the increase is about 100 per cent., as without it the crop can only be sown on half the area.

8. (1) On lands under loog term leases, Rs. 12 per nero. On lands under season leases, Rs. 22 per nero.
(2) On londs under long term leases, Rs. 30 per nere.
On lands under season leases, Rs. 20 per nere.

9. (1) Re. 3 per sere on the average. This is paid on the area irrigated except for long term and kharif leases, in which case it is poid on the area entitled to a

(3) All.
10. The construction of village and field channels. 10. The construction of village and held channels. The village chonnels are made by the laudlord in case of bhaoli land, that is, where the crop is divided. Where rent is paid in eash, village channels are, as a rule, made by the cultivators unless the landlord has a direct interest in the irrigation. Field channels are made by the cultivators. Wherever actual cash expenditure is neutred, the work is done by the landlord. If expenditure is incurred by individual cultivators on construction of village channels, rent for the yea of the channel can be recovered under the Rangal Irrigation Act, provided the person who great the

Bengal Irrigation Act, provided the person who spent the money is registered as owner of the channel.

11. None in the districts of Shahabad, Patan and Gyn with which I om equainted. The slope of the country is fairly steep, shout 2 feet per mile, and the water flows off freely if not obstructed.

Statement showing the average rainfall, month by month, for the year 1901-1902.

Station.	April 1901.	May 1601.	June 1901.	July 1901.	Angust 1901.	Beptember 1001.	October 1891.	November 1901.	December 1901.	January 1902.	February 1803.	March 1902.
1	2	3	4	ē	6	7	8	0	10	11	12	19
1		_			40.40	5 23	2.00		0.00	0.00	2.05	
Daukipora .	0.00	1.50	0 83	12:08	10-18	5-23			0.00	J W	0 05	1001

- 1: Q. (The President.)—You are Executive Engineer of the Eastern Soue Ceaals?—Yes.
  - 2. Q. How long have you been here?—Four years in April next.
  - 3. Q. Where were you before?—One year in Orissa; before that five years in Shahabad.
  - 4. Q. Then you know the country well in these parts?
  - 5. Q. Is there any value attaching to the silt carried down by the Souc river?—Cultivators attach great value to it.
- G. Q. In all seasons of the year?—It only comes during the kharif season.
  - 7. Q. It has alluvial matter in it?—Yes; it improves the fields close to the eatlets very much.
  - 8. Q. You have submitted a paper upon the Gya pains and ahars. These Gya works have not come under you?—No; a great part of the district is in my jurisdiction; however, I have the Grand Truuk Road through the Gya Dietrict; also civil huildings.
  - 9. Q. Do you consider there sheald be provision of masonry head-works on pains?—Yes, that is very important.
    - 10. Q. Who should pay?-The laudlerds.
  - 11. Q. Would they pay do you think, or would they consider it u hardship?—I don't think they would consider it u hardship to pay. A great many of their pains owing to the absence of head-works have become too wide, and damage is done which they are trying to remedy, but cannot do so.
  - 12. Q. Is there any sort of maintenance establishment P Are there patrols P—No, the Tahsildar with the cultivators manage them.
  - 13. Q. Have you seen anything of the disputes among zamindars?—I have never been personally in any of the disputes; several of them have come to my knowledge when travelling about the country.
  - 14. Q. Would you recommend putting pains and chars under professional charge?—I think some Public Works officer should be required to inspect them once a year when the time came for repaire and to propose rough estimates of what should be done; this should be sent through the Collector. If work was not started within a reasonable time, Government should take it up.
  - 15. Q. You consider that the Executive Engineer should have the responsibility?—In most cases it would only be a line of levels and an estimate.
  - 16. Q. De you consider it should be put under a Public Works officer, or should there be special district provision for it?—A special officer, I think; not a man in the position of Executive Englueer.
  - 17. Q. You say in your memorandam "the question of the provention of bunds across the rivers is a more difficult one. The supply of water in all the rivers in years of senaty rainfall is not safficient for all and the need of water is so great that it would require an armed force to prevent the cultivators making a bund across a river when they saw their own crops dying and water going past which could save them." That requires very claberate arrangements; you would have to see not only that there was a taw, but that the law was carried out?—That would require a great deal of care no doubt; most pains want work without u bund when the river is low.
  - 18. Q. I gather you would not interfere with ahars; you say in your note "the construction and maintenance of ahars is, in my opinion, hest left as it is. The landlerds and cultivators understand the principles under which they can be worked estisfactorily. By these means a large quantity of water is stored for fature use, and given good rain in August and at the cad of September the crop dependent on them is assured "?—That refers to the Gya District where the thing is managed very well. They want masonry outlets.
  - 19. Q. I suppose there are a great many of these ahars?—Yes; as a rule, a few outlots would brigate the area commanded.
  - 26. Q. Havo you any acquaintance with the Bhabua Sub-division ?—No; my inrisdiction extended to the Buxur Caual.
- 21. Q. You know nothing about the Karamnassa project ?—No, except what I have seen looking through the papers.

- 22. Q. Have you any suggestions for increasing the supply of the canals? Is there any means of doing it? —Oa this side of the river we still have room for improvement, but not on the other.
- 23. Q. You are not tight for water ?—As a rule, there are only 200 cubic feet spare, for which leases have not been given. The people are inclined to be somewhat lazy and won't do whet we tell them.
- 24 Q. (Sir Thomas Higham.)—You say it is possible to grow a second crap of rice with the help of canal water. Is that second crap that you refer to charged as a separate crop?—No.
- 25. Q. If a field has been watered for a rice crop and then rabi is grown, don't you charge for it?—Wo charge for the rabi if he has to plough his land and then sows agaia, if water is taken after the rice is cot.
- 20. Q Can you always tell when that is?—Yes, by the nature of the crop, hat if it is a paira crop, then no charge is made.
- 27. Q. Are measurements made by your own mea ?—The patrol does it first.
- 28. Q. You say in a year of rainfall the use of canal water increases the yield 10 per cent. How do you arrive at that figure; is it based on anything ?—Yes, it is arrived at by a comparison of similar figures in a year of ample rainfall and by experiments made every year in the fields.
- 29. Q. Do you weigh the ontturn?—We take the whole of one plot, say, one-eighth of an acre, have it thrashed out in our presence and weighed.
- SO. Q. Is 10 per cent. generally accepted as a fair statement of the increase dae to irrigation?—I think so.
- 31. Q. How much does that mean ?-Two maunds an acre.
- Q. (Mr. Allen.)—Two manuals of paddy or rice?— Two manuals of paddy.
- 33. Q. (Sir Thomas Higham.)—With regard to what you say in paragraph 8 (1), I don't understand how the term of the lease affects the produce?—Long term leases have the advantage that they are sure of the water and get it at once.
- 84. Q. With regard to what you say in paragraph 9 (1) as to the rate being Rs. 3 per acro on the average, is that not above the notual rate?—I take two-thirds of the area at Rs. 2.8; the rabi area is very small and sugarcane is Rs. 5 an acre.
- 35. Q. You don't answer the question whether the oultivator pays anything to the owner of the land on enhancement of reat?—I am not fully acquainted with the subject.
- 33. Q. You don't know whether he does !—I know the landlords are always trying to raise it, but they have difficulty in doing so.
- 37. Q. How does he do it?—One way is that in bhaoli they will not agree to convert into maked; notes the man pays a very high rent. If the village is naked; and improvements are required, he will not assist the caltivator if he can help it naless a higher rate is paid.
- 38. Q. Do the landlorde pay part of the water-rate?—In bhacli they settle it with cultivators. On this side of the river they help the cultivator.
- 89. Q. When you get these applications for big blocks, do they water every acre in that block every year f—Yes.
- 40. Q. Have you not such things as fallows?-No. They usually have two years paddy and the third year engarcane.
- 41. Q. Do you over all up any ahars outside the blocks f-No, because they won't buy the full quantity of water.
- 42. Q. What is the rate for selling water?—Re. 1 per cubic foot per second for 21 hours.
- 43. Q. Do they ask for water to ahars on payment?—Very seldom.
- 44. Q. Supposing there is water going, do they never ask you to fill up their tanks?—We fill their eattle tanks free, but not ahars.
- 45. Q. (Mr. Muir-Muckenzie.)—I understand you hardly consider it practicable to prohibit the making of bunds across the rivers altogether?—I think it would be very difficult to do it.
- 46. Q. Would it he possible to ascertain the potentialities of the rivers and decide where bunds should be erected?—

Mr. W. S. Bremner.

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Mr. W. S. Yes, that might be done. Landlerds have certain rights Bremner. now; I presums you would not buy them out.

47. Q. The rights are assertained ?-Yes.

- 48. Q. You said you had roads as well as huildings; do yoo find that the work of irrigation officers is interfered with hy their other duties?—This is a comparatively light irrigation division; the area irrigated is 90,000 acres.
- 49. Q. Is it within your power to grant remissions ?— For failars of crop we grant ten-anon remission.
- 50. Q. The total remission is small?—Yes, amount is granted every year owing to blight, etc.
- 51. Q. You don't limit the remission to failure of .orop?
  -No, if there is a failure of water we give total remission.

52. Q. That is very rare, I soppose ?- Yea.

- 53. Q. What is the agency for determining the remission, do you inspect yourself?—The Sab-divisional Officer has a zilladar and other officere; he either inspects himself or deputes a zilladar to do it; they go to the spot and take the evidence of the patrol and headman of the village.
- 54. Q. Remission is not granted without complaint to yos !- No.
- 55. Q. As regards repair of pains; Mr. Oldham recommends interference by the Collector only on the compleint of caltirators; woold you go further; do you wish repairs to be enforced marely on inspection?—I think repairs should be enforced on the iospectico of some responsible officer.
- 56. Q. You would not wait for the complaint of the cultivators f-They would not complain.
- 57. Q. Would not that mean an enormons amount of work; the maintenance of a considerable establishment !-I suppose two sapervisors for Gya would be eacagh.

58. Q. And nobody under them ?-No.

- 59. Q. You woold not recommend any such inspection in the case of ahars?—Ahars in Gya are kept in fairly good order.
- 60. Q. (Mr. Rajaratna Mudaliar.)—As regards the measurement of irrigated lands, who cheeks the zilladar's measurements ?- The amin measures and the zilladar
  - 61. Q. It does not go to any higher officer P-No.
- 62. Q. The measurement of zilledar is sufficient Pgreater part of the area is cadastrally surveyed and it is takeo from that.
- 63. Q. Are the blocks demarcated with etones P-No, on the endastral map they are bounded by a lins; the amin takes the map and fills in the block; he measures every field within the line.
- 64. Q. Supposing a man cultivates beyond the line? Then we cannot assess him; we cannot assess beyond the boundary; be gets the henefit of it.
- 65. Q. A block may he 50 acres, he may irrigate 10 ecres beyond the line?—Then he gets the benefit.
- 66. Q. Don't you fine him !-- Under the law we cannot do anything; we merely make a acte of it.
- 67. Q. (Mr. Muir-Mackenzie.)-Do you think a very mach larger area is irrigated than is ontered in the leases? --Yes.
- 68. Q. Don't you think it would be reasonable to assess a man who goes outside his block?—We cannot do it.
  - 69. Q. (The President.)-I think it is a very good thing

- and tends to encourage economy of water. If a msn irrigates his track of, say, 50 acres and thinks he can add 10 acres to it, it will be to the advantage of the country?

  —We take good care not to give out lesses to blocks from which water could be easily taken beyond the boondaries.
- 70. Q. (Mr. Muir-Mackenzie.)—Don't' you think it would be reasonable to obargo something for water that is drained out?—It would lead to a great deal of complaint; you turn the water to their lands; they don't come and take it.
- 71. Q. (Mr. Rajaratna Mudaliar.)—What is the poy of a zilladar?—Rs. 50 to Rs. 100.
- 72. Q. The Sub-divisional Officers do not cheek the figures of the zilladar; do they P-No.
- 73. Q. Is there any rale on the sabject ?-No, the block system prevents any wrong measurement; after measure-ment of the area the bleek is taken out of the map and a comparison made.
- 74. Q. In the absence of demarcation, do you tbink the block system is of any nse?—The block system cashles us to obeck the area.
- 75. Q. How is the excess aree discovered?—The patrol after a little practice can very easily tell from the map.
- 76. Q. Since the excess area is not obarged for, do you think there is any inducement on the part of the patrol to bring it to your notice? Can he not be easily bought off? Dring it to yoar noticer. An ne not be easily booght our —I dere say he can, but we can catch him and then his is panished. We make it our business to give out leases to sach blocks, as we will not loss by. The block is demarcated by a ridge all round, that is one of the conditions of granting a soven years' lease; the caltivators make a ridge 18 inches high and a foot wide at the top.
- 77. Q. (Mr. Allen.) You spoke of a considerable area Proceedings are some powers of a considerable area being irrigated for which nothing is paid, can you give any figore?—It varies with the different years; oar casals supply enough water to irrigate the whols area in a dry year; if yon get one iach of ram 33 per cent. goes beyond the boundary.
- 78. Q. About this Gyaquestion you say two enpervisors could go over the district and see after the pains; what is the number of pains?—150 to 200.
- 79. Q. Have you any idea of the mileage?—I don't know. If the supervisore started in November, they would have finished the inspection of these pains by January.
- So. Q. Is your scheme confined to the main pains?—Yes, I should only take up the main pains and ensure that they got a good supply.
- S1. Q. It is the head-work that you would confice your-self to !- Chiefly.
- S2. Q. We have had a proposal from Mr. Oldbam that the Collector should look after streams in Gra. How many ahars would there be?—They would run into a thousand. There is a great part of Gra where there is no irrigation whatever; the northern half only would have to be confident. be coosidered.

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- 83. Q. There is probably one ahar in each village?—About that. There are very little south of a liae taken from Anraogabad to Nawada.
- 84 Q. Yon said irrigation would give 2 mannds of paddy per nero; what do your crop cattings show irrigated per field?—They vary very mach. Unirrigated crop would give ynn 17; irrigated comes to about 20.
  - 85. Q. Is that in a year of good rainfall ?- Yes.

WITNESS No. 18.—BABU SARODA SUNDER PAL, Executive Engineer, Boxar Division.

(Replies to printed questions.)

Babu Strode Eunser Pal.

#### A.-GENERAL.

- The answers refer to that portion of the district of 25 Oct. 02. Shahabad which is commanded by the Sone Canals. I bayo heen employed oo irrigation works in this district for the last seven years and-a-half.
  - 2. Statement attached.
  - 3. (1) No.
  - (2) No.
  - (3) No. The caltivators do not care much to manuro ordinary fields, nor have they got safficient for all their The caltivators do not care much to manuro.
  - (4) Hardly any. There are black soils to which irrigation does not do much good, bat such soils are not extensive.
- In ease of failare of raiofall, such soils also sometimes 1squiro water for soltivation.
- (5) Yes. The maximum capacity of the Sone Canals has almost been fully leased out, and in case of drought some of the area under command cannot be irrigated or cultivated. (6) No.
  - (7) Yes. There is some obstacle where the cultivators
- have got no right of ocenpancy, nor can they claim any fixity of root.
  - (9) No reason I know of, except those noted above.
- 4. I bays not got much personal knowledge on this point. For the land irrigated from the Sone Canal system, the land

Babu

Sunder Pal.

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rest is onhanced by the zamindars when the lands come under a long-term lease. I think the existing provisions are sufficiently liberal.

5. I have got no personal knowledge on this point.

6. Not much. The oultivators will migrate to the irrigated area, if it be not too far off their old homes. During my tours in the interior of this district, I have come scress some helf-descreed villages situated far from the canals, from which the cultivators are said to have migrated to irrigated areas. Instances are villages Pachonna, Bisi, Besswan, Dohra and Hothna. The people are very anxious to have the irrigation extended. to have the irrigation extended.

#### B .- CANALS OF CONTINUOUS FLOW.

- 7. (1) One and-a-half times nearly.
- (2) Almost dnuble.
- (3) (a) Not much.
  - (b) Double.
  - (c) Ten times.
- 8. (a) About nno aud-a-half times.
  - (b) In a year of drought the crop on most of the unirrigated area ranges from nominal crop to almost or total failure, and the difference becomes out of proportion.
- 9. (1) Rs. 2 for the rabi, Rs. 2-8 for long-term lesse, and Rs. 3-8 for annual kharif and for rice, and Rs. 4-8 for the hot-weather crop in form of water-rate.
  - (2) Rs. 2 to Rs. 8 in the form of roat.
- 10. The construction of suitable channels is necessary. This is done mostly by the cultivators and sometimes by the hudderds. In the latter case the landlord gets the channel tent for the use of his channel from the tenants. Where the cultivators make the channel, their scennity consists in the certainty of tenure and expectation of good yield.
- 11. No demand I know of has been done to the people. The sandy soils are improved rather than deteriorated by irrigation. Too profuse, too extensive, and too frequent irrigation, which the cultivators are prone to take, waterlog the soil, and generate malaria, and thereby deteriorate the climate. This can possibly be remedled by proper draining of the lands and restriction of anply to proper quantities just necessary for the maturing of the crops. This will come on gradually as the cultivators are taught their necessities by proper enforcement, with discretion, of their necessities by proper enforcement, with discretion, of the intermission of supply (tatit) according to the necessity of the crop. The irrigation and its evil are of 25 years' standing. I think it is not increasing. Intermission in the supply by tatil system was introduced a few years upon and is being gradually enforced everywhere, and is expected to check and dimbuish the syll. I have not get experieure of draining the irrigated acres : I believe drainage will improve the lands as well as the climate. There is no improved drainage system in the district coming within my observation.

- 23. There are no big tanks in the district I know of hardly any worth the name.
- (1) The small tanks, called akaras, are filled with drainago water of the country.
- .2) The water is taken to the fields through small channels, and mostly lifted to them by means of ordinary nater-lifts, such na dhouries, dum, etc.
  - (3) (a) Throughout the year, except the hot months.
    - (b) During the rainy season only.
    - (c) Nil.
- (4) That varies from 50 to 400 bighas necording to the size of the tank.
  - 2'L (1) About one and-a-balf times from big abaras.
- (2) Hardly any, as the tank generally fails during the year of drought.
  - (B) (a) Nil.
    - (b) Double.
    - (c) Nil.

- 25. (1) 25 to 75 per cent. according to the delay.
  - (2) 90 per cent., and if not, cent, per cent.
  - 26. In year of scenty rainfall well irrigation is resorted to at the end of the season. This is very essential, but few can do it, and the results cannot be very satisfactory for the rice cultivation.

27. (1) 50 per cent.

- (2) Nil.
- 28. (1) Nothing, except manual labour for repairs to the tank and channels.
- (2) Not much, although they have to pay a little enbanced rate of rent on area irrigable.
- (8) Nothing.
- 20. The expenditure is in lifting the water to the fields and making the channel. This is down by the tonants.
- 30. By the touents. I have taken no notes on these points. I think no legislation is required.
- 31. Other owners got water only, if available, at a nominal nest. No legislation exists for this district, nor any required.
- 32. Yes, by advances under the Land Improvement Leans Act.
- 33. The silt deposited is not much, and is generally removed by tenants by the hand, whonever necessary.

#### E .- WELLS.

- 34 I have examined carefully only the area commanded by the Sone Canals.
- (1) The average depth of water in the permanent wells vary from 10 to 30 feet according to the localities.
- (2) The supply is from both percelation and springs, and that from percelation generally fails in years of drought, and that from spring, partly. I know of no well boing unfit for use from the water becoming too saline.
- (3) The average cost of construction varies with the dimension and the depth to which it is sunk. I have seen stells constructed for Rs. 100 only. But big wells cost sometimes as much as Rs. 600.
- (4) The permanent wells last for a long time. I have seen wells in use, which are said to have been constructed two or three hundred years ago.
- (0) The water is usually raised by mots worked by bullocks, and also by latha worked by mon.
- (6) That depends on the size of the well and the depth of mater in the same. Some wells will irrigate as much as 25 lighas, and others not oven 4 bighas.
  - (7) I cannot say.
  - 35. (1) One and-a-half times.
  - (2) As much as doublo.
  - (3) (a) Nil.
    - (b) About double.
    - (c) About five times.
- 36. (1) Cent. per cent. by substituting more for less valuable crop.
- (2) Ten times, as the produce on the unirrigated area in n year of drought is very small, if any at all.
- 87. (1) About double when the well is made by the cartindar, and nothing when it is made by the caltivators themselves.
  - (2) Nothing.
- 38. (1) The cultivators have got local experience, and that is their guide; no serious difficulty is experienced.
- (2) Yes. For want of capital in many cases. I know of no such assistance being offered.
- 89. No. The zamindars will do it when they are anreof getting their lands outlivated at an enhanced rate.
- 40. Yes. They are a great protection against drought. Their construction may be encouraged in a year of scanty rainfall by advances of money at the rate of its. 5 ta Rs. 10 for each well, including the price of mot, etc., to be recovered from the cultivators when the crop is harvested.

### Rainfall statement for the last ten years.

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Month.	1602-93.	1803-01-	1891-95.	1802-00.	1898-97.	1807-03.	1999-09.	1699-1000.	1000-1001,	1901-1902.	Total.	Average for 10 years.
April May June Juny August Soptember October November December January February March	0.00 0.15 5.32 8.81 22.52 2.72 0.08 0.60 0.00 0.06 1.56 0.88	0 06 1 00 6 56 12 21 7 37 10 21 8 47 0 78 0 00 0 35 1 60 0 00	0·02 0·00 7·39 20·36 10·52 5·26 10·80 5·26 0 08 0·43 0·41 0 11	0-68 0-23 4-32 17-08 16-31 7-92 0-60 0-60 0-60 0-00 0-00	0.00 0.28 8.64 8.68 7.30 2.06 0.00 0.45 0.37 0.01 0.68 0.45	0-07 0-13 5-23 11-69 14-23 4-24 4-20 0-00 0-00 1-87 0-00	000 059 4:11 10:29 15:47 11:41 0:30 0:00 0:04 2:43 0:00	0·34 0·41 11·17 20·53 10·75 2·23 0·80 0·00 2 96 0·33 0·00	0 01 0 40 4 08 10 42 5 55 8 86 1 68 0 00 0 97 2 61 1 45 0 54	000 1.67 0.22 7.82 13.63 4.20 0.82 0.01 0.00 0.00 0.00	1·21 5·45 57·02 127·42 181·64 59·74 27·81 7·13 1·96 9·49 8·38 2·10	0·12 0·54 • 5·70 12·74 13·16 5·97 2·78 0·71 0·20 0·91 0·83 0·21
Total .	49:30	49-51	GG.67	47.61	29.81	41.66	46.6b	49.58	30 61	27.79	439:29	43.90

- 1. Q. (The President.)-You are Executive Englacer of the Brant Division ?-Yes.
- 2. Q. Have you been long in the Division? I was there twee-once in 1895-96 and again last year.
- 3. Q. You say in paragraph 4" there are black soils to which irrigation does not do much good." What ore these black soils; does rice grow on them?—They grow very little rice; they generally grow wheat.
- 4. Q. Is it a good erop of wheat!-Yes, the area is pretty large.
  - 5. Q. Do they try cotton upon it?—No.
- 6. Q. Have you seen that soil in other parts of the country ?-No.
- 7. Q. Where were you before you went to Burari-I was all along in Shahabad.
- 8. Q. The Buxar Canal preses through Bhabua?-Yes, a part of it does.
  - 9. Q. Do you know Bhabua well?-Yes.
- 10. Q. Do you know this scheme for a reservoir in the hills ?—Yes, I have been in the hills to investigate it.
- 11. Q. Did you take any levels?—No, the season was not suitable for it; it was in the rains.
- 12. Q. Did you make any observations?—I only went over the country to see if the sites were sultable for rico cultivation.
- 13. Q. Did you inspect the site?—I saw the Dargaiti sile; that was the smaller one.
- 14. Q. The country is all covered with jungle?-Yer, where the re-errors are proposed to be constructed.
- 16. Q. Do you think people would be glad to baye brigation there?—I think they would readily take water.
- 16. Q. Could suisiting be done to supply the Buxar Canal; could not send more nator into it?—People would take water gladly, but the Buxar Canal cannot be supplied from these reservoirs. The levels will not allow of it.
- 17. Q. In reply to question 11 you allude to the evils done by over-strip stron; is there much of this evil ?-Yes.
- 18. Q. You say in your note "too profuse, too extensive and too frequent freighten, which the cultivators are grone to take, nater-log the soil and generate malaria and thereby deteriorate the climate." Is there much of this cril?—
- 19. Q. And is the land injured !- The climate is injured.
- 20. Q. About what pre-portion of the village land do you irrigate f-50 to 60 per cent.
  - 21. Q. That is rice !- Yes, besides that we also get some rabi.
  - 22. Q. You say the climate is injured. Is there clear proof of that?—There is more fever now than before.
  - 23. Q. Yon say in the same paragraph—" Intermission in the supply by tatil system was introduced a few years ago, and is being gradually enforced everywhere and is expected to check and diminish the evil." Has it checked the evil f—It has not already checked the evil. If it is enforced during the rabial and dry weather seasons, there will probably be no oril.

- 24. Q. As regards the Bhabus Sub-division, supposing it is too expensive to make the Karamunasa reservoir, what could be done for the Division to ward off famine?—Utilize the water of the local streams.
  - 25. Q. Could nothing be done by wells P-No.
  - 26. Q. Why?-They irrigate very little from well.
- 27. Q. In other parts of India they irrigate a great deal?—I think the cultivators here are lary.
- 23. Q. Could anything more be done by chare?—There are some chars, but they are not of much use. In a year of deficient rainfall they do not fill up.
- 29. Q. Have you navigation in the Buxar Division ?-Very little now.
  - 30. Q. Why is that !- The traffic goes by rall.
- 31. Q. Did the people like it f-When there was no railway people went by attemer.
  - 32. Q. Are there locks in the Ganges?-Yes.
- 33. Q. Are they used?—Very little. Hardly any boats now go up the Baxar Canal.
- 31. Q. Are there locks there?-You but they are seldom nucd.
- 35. Q. (Sir Thomas Higham.)—You refer in your memo. to lighas; what is a lighas?—The standard Bihar digha, the of an acre.
- 36. Q. You say that the sayate get a great deal more after then as necessary for their crops. What is the standard water them is mecessary for their crops. What is the supply ?-One cul is foot per second for 50 Lighas.
- Si. Q. If you have a block of 100 seres, you give cuble feet per second night and day? Yes, for ten days.
- 35. Q Do you think that too much, or do they take too well?—I think that is too much. I have tried in Arrah to get it reduced to 62% acres and have succeeded.
- 39. Q. Is that a regular rule of canals to allow one cubic foot per recoud for 50 acres! - Formerly it was
- 40. Q. Is that the rule of the Superintending Engineer?
  -Yes. But for the last three years we have changed that.
- 41. Q. You only allow that ten days out of the 15?-
- 42 Q. How did you ascertain that ?- I found it out by experiment.
- 43. Q Some of our witnesses say they don't get enough of water ?—In certain Sub-divisions there was no complaint of short supply.
- 44. Q. The water run continuously on the fields, or is it shut off when a field is filled and passed on to the next? -It runs continuously for ten days.
- 45. Q. You say there are obstacles to the extension of irrigation; what are they f.—They will not take long leaves, because they are not certain of remaining in possession of the fields; they might be turned off while remaining liable. for the mater-rate.
- 45. Q. Are the only people who take long leases those who have rights of occupancy f-Mostly.
- 47. Q. (Mr. Muir-Mackenzie.)—In reply to question 4 you say "for the land irrigated from the Sone Canal

system the land rout is enhanced by the zamindars when the lands some under a long-term lease." Does that apply equally to lands in which the rents are cash or bhack the Yes, to both.

- 48, Q. We have had some evidence that the zamindars enhance routs; when there is a cash rout, how does he mannes it?—First, he makes difficulties in irrigation; he will arrange that the people should not get water; when they do irrigate their fields and see the benefit of irrigation and ask for long lease he puts difficulties in the way.
- 49. Q. Do you know any instances of this?—I have seen rents of fields raised from 4 nums to Rs. 4.
- 50. Q. Were these occupancy too ants or tenants-nt-will P-I don't know.
- 51. Q. You say in answer to question 34 (4) "the permanent wells last for a long time. I have seen wells in use which are said to have been constructed two or three hundred years ago." Are these large and expensive wells? -Yes.
- 52. Q. I suppose these wells that cost Rs. 100 would not last very long ?-No.
- · 53. Q. What is the cost of the big wells ?- From Rs. 500 to Rs. 1,000.
  - 54. Q. Have they 8 or 4 mote?-Yes.
- 55. Q. And they are pakka ?-Yes.
- 56. Q. Would a hundred rupes well have a single mot?
- 57. Q. (Mr. Rajaratna Mudaliar.)—With regard to what you said about 1 ouble foot of water being sufficient for 100 lighas, what was the nature of the experiments you made?—I took a note of the water discharged from you made?—I took a note of the water discharged fro the ontlots for 7 or 8 days and then worked out the area.
- 58. Q. Did you took the authors from the fields in which you made experiments !—Yes.

- 59. Q. In different systems of irrigation?—I compared the outturn with the provious experiments on the same fields; it was not inferior.
  - Bahu Saroda
  - 25 Oct. 02.
- 60. Q. How many experiments have you made in that way ?-Ton in each year.
  - 61. Q. As regards actual outtnra ?-Yes.
  - 62. Q. And in the same fields ?-Yes.
- 63. Q. Did not the raiguts complain that owing to intermittent supply their outturn was diminished?—No, they did not complain to me at loost.
- 64. Q. (Mr. Muir-Mackenzic.) Yon know Bhabua? -
- 65. Q. Do you feel confident that the people there will readily take irrigation P-You.
- 66. Q. Supposing there was a year of good rainfall immediately after water is introduced will the people hang back, do you think?—In certain parts they cannot do aithout water even in a year of good rainfall.
- 67. Q. (Mr. Allen.)-You said non-occopancy tonants would not take long leases for fear of being turned off and still be liable for the water-rate, would the Irrigation Department not reduce rates?—In some instances the men fled from the villages and we did reduce the rates.
- 69. Q. You would not levy your water-rates on a man who had abaodoned his holding P—No.
- 69. Q. With regard to what you said about enhanced rents, what sort of land was that on which the rents were raised?—Sandy.
- 70. Q. Is salami paid by raiyats before they work a well P—I have not heard of it.
- 71 Q. (Mr. Muir-Nackenzie.)—Can you give instances where rents were enhanced?—Yes, in Deogons, Dharupur and Amai. These came to my personal knowledge in the

### THIRD DAY.

#### Muzasfarpur, 27th October 1902.

### WITKESS No. 10 .- ME. E. T. SEALY, District Engineer of Champaran.

- 1. Q. (The President.)—You are, 1 understand, District Engineer in the Champaran District?—Yes.
- 2. Q. And have you been there for a long time?-Twenty-six years.
- 3. Q. Then you must have even it through all the so-called famines?—I did not see it in the first year of famine. I was in Clapm in 1874. But I have seen everything rinco 1676 whom I came here.
- 4. Q Looking at the number of men employed on famine relief work, you never had works on a very large scale in Champaran?—In 1896-97 there was a good deal, but not before.
- 5. Q. I see that in the north-west part nine per cent. were employed and the rest from three to eight per cent. in the south !- Yes.
- 6. Q. From what you know of the district do you think that famine protection is necessary all through it?—In some years it is of great advantage.
- 7. Q. In all parts of the district ?—All north of the Bikrana probably.
- 8. Q. Has there been any distress south of the Sikrana?—Not to the same extent as in the north.
  - 9. Q. What is that due to; the rainfall !- Yes.
- 10. Q. I gather from these papers that there is practically no irrigation south of the Sikrana?—No, the people will not irrigate south of the Sikrana. They say the soil deteriorates from irrigation, and they must be very hard up indeed to use water. I have no doubt it would be useful at times, but then they are afraid to use it, because they say that if once they are water, they will always have to use it afterwards.
- 11. Q. There was no fumino there?—There has been scarcity, but I should not call it actual famino.

- 12. Q. The state of the country is better here than north of the river I North of the river is principally rice cultivation, and when the rice feels, the cultivators have nothing to fall lack upon. South of the river they have several crops, so that if they lose one they generally get one of the others.
- 13. Q. That is really the difference?-That is the principal reason.
- 14. Q. So in a year of drought, if the people to the north of the Sikrana could turn themselves to something besides rice, they would be just as well off as those to the south of the river?—You cannot grow rubi there without irrigation, or the rabi you do grow is very poor.
- 15. Q. Have you been concerned in these irrigation schemes in the Tribeni?—I have always taken great interest in these schemes, and during the familie of 1897 I was in charge of the famine work on the Tribeni Canal.
- 16. Q. But you have not to do with it now. It is an Imperial work ?—Yes,
  17. Q. And the other schemes have you anything to do
- with them?—Yes, with a small scheme near Rammaggar where in 1897 we made n pain. That has been under my charge since then. Subscriptions are levied on the people that want the water: they pay the money when asked
- 18. Q. What river is that from !-It is from the Massan
- 19. Q. Is the irrigation very extensive f-About 15 miles in length and an average of 3 or 4 miles in width.
- 20. Q. Have you been called upon to do much or to do anything for the pain; I mean for the clearance of it or for the rectifying of it in any way?—I have a man in charge who takes steps under my orders to carry out any work that is necessary.

- Mr. R. T. Sealy.
- 27 Oct. 02. ve
- 21. Q. Are district funds called upon to du that ?—It is entirely paid for by subscriptions levied according to the area of irrigation.
  - 22. Q. Does that work well?—Yes, it works without any trouble.
  - 23. Q. There is na great difficulty about getting the maney ?—I have had no difficulty. They send their money ta the Callectar on the estimate made aut by me.
  - 24. Q. Then every time you have work to do, have you to ask them whether they are willing to pay for it?—No We levy a rate per bighs per year, and I have had a surplus generally and that is brought on to the next year.
    - 25. Q. Then you frame a hudget far tha year? -Yes.
  - 26. Q. How much does it cost a bigha?—Last year it was six annas. This year there was a surplas and so we braught it down to three annas.
    - 27. Q. What is the bigha hero?-93 to 10 haths.
  - 23. Q. What part af an acre?—It would be about two acres per bigha. A ligha a little further to the west is as much as 13 haths.
  - 29. Q Naw within this cess have you ever carried an any masanry wark?—No, we have not done anything. We have built a small wall across one pain, but you would not call it a masonry wark.
  - 30. Q. Lauld the system you are warking apon be extended so as to get proper masanry weirs for these pains?—Yes, I think so.
  - 31. Q. Da yau consider they are necessary ?—I think they are very necessary. They would be a great advantaga to the country generally.
  - 32. Q. Is there mach dispute as regards the irrigation? Do the people far down the pains make it a grievance that they'are cut aff from the water by the upper people?—They complain that they do not get as much water as they wand like. That af course is a thing we have no control over. The water is limited to the minfall.
  - 33. Q. Is there any sart af understanding, written or unwritten, as regards each man's share?—On aur pain we divide the whale length inta four sections. The duties are fixed on the area, and each section is watered far so many days; and this is carried out regularly right through.
  - 34 Q. (Sir Thomas Higham.) There are no pains above yours? No.
  - 35. Q. (The President.)—The irrigation in the upper part is obliged to be used to let the water pass?—Yes.
  - 3c. Q. And is that carried out to the satisfaction of the people generally, ar are there disputes P—I have not heard af any cases where it has been fingrantly upset.
  - 37. Q. Do you shut them up?—Yes. If it were left to the people, they would not shut it up.
  - 38. Q. What yan are saying applies to the pains in general, ar just to that particular one from the Masan? You are aware that there are a number of rivers in the district used for irrigatian. Daes what you have said apply to them all?—Certainly.
  - "(The President.)—Mr. Kilby has given us a paper in which he says:—"When it is found that any one person is appropriating to his awn use the whale of the water of any particular stream, the order that is generally passed is that he must make a han, and allow half af the water to pass an. This is unsatisfactory, as abvinusly those who have bunds high up the stream get a great deal more water than those helaw. A han, one can be easily tampered with. Anyane can stap it at night with a few basketfuls af earth. Detection in such cases is very difficult, as it is situated in the locality of peaple who wish to stap it and far fram those persons living lawer down tha stream who wish it to remain open. The hanj system is in every way unsatisfactory. A better system is af fixing dates an which villages along the caurse of any stream shall he allowed to take water from it. This is done in the case of the Masan pain which is under, the cantrol of the Executiva Engineer. Gavernment has a right to the cantrol of tho water of this pain as it was constructed by a famine work. It is almost impossible, however, to induce natives to accept this system in other streams, and at present it is impossible to compel them." Is that your own experience?—It is very difficult to carry that out in ather streams. The cast of making. a bund across a big stream wauld mean a great deal af maney.
  - 39. Q. Would the agriculturists make a great row if interfered with ?—I think they would da what they were told. I think the Callectar's order would be quite sufficient.

- 40. Q. Mr. Kilby goes on to say that the only way to compel the people is to bring these systems under the Irrigation Act to dispose of disputes summarily. Do you think there is any accessity for that?—It would prahably make it more casy.
- 41. Q. Wauld it be popular?—Fes, I think it would be papular, because villagers are continually asking the Collector and other officers to assist them by making the different villages who want the water combine. They never combine an their awn initiative.
- 42. Q. Is it not prabable that some af the more powerful people get far more water than they are entitled to, and that they would hatterly resent anything af that kind?—I think sa.
- . 43. Q. They would be opposed to any reform of this sert?—Na, I den't think they would do that, because they would he served so much hetter. I don't think they would object to it.
- 44. Q. The mancy that you receive from this cess, which you say is so many annas on the bigha, is it put into one common parso f—It is held by the Callector and drawn on by me as I require it.
- 45. Q. There may he this feature that a man upon one canal may be paying a coss, while far that particular year he will not get the henefit of it?—I think they all got the benefit during the year they pay for it.
- 46. Q. Supposing it was determined to introduce masoary head-works into these pains, would a man on A. Cansi he willing to man a cess to huild one for the henefit of a man, or B. Canal knowing he would get no benefit?—The first work required would be at the head of the canals and that would serve everyhody.
- 47. Q. Is there enough comman spirit among them to make them agree to pay a certain cess, year by year, knowing that during certain years they would not get any advantage?—They would get same advantage from it, and I don't think there would he any difficulty in that. Of course that would he one of the things that might crop up, and hy bringing it under the Irrigation Act, you would do away with any difficulty.
- 48. Q. I notice that south of the Sikrana, at any rate in the Saran District, there is a great deal of well irrigation and very little in Champaran. Why is that?—The people in Saran make very much mare use of the limited amount of water that there is than they da in Champaran. That is practically hecause there is a thicker population there.
- 49. Q. In Champaran, according to this statement, there are only 1,413 acres under well irrigation, whereas in Saran it is 141,586 acres !—Yes.
- 50. Q. What is the reason of that great difference?—The sparsity of the papulation has samething to do with it. In Champaran there is very much more land than they can cultivate, and the papulation not being large, they have not got the labour to do it.
- 51. Q. Have you any other saggestions you would make as regards the protective works to avert famine?—There are several, but no schemes have been brought up sufficiently. Generally speaking, I would make more ase of the hill streams. (Witness painted aut several rivers an a map and described what could be dane in cannection with them.)

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- 52. Q. In the Preliminary Reports on three schemes for irrigation in the Champaran District yau say—"I think all three af the schemes will be most valuable to the country served, not only in dry years, hat also in ordinary years." In dry years would these streams have water in thom?—There is a certain amount of water in them.
- 53. Q. During the dry year af 1896-97 was there a certain supply coming down?—There was. The Pandai did a good deal of irrigation in that year.
- 54. Q: Do you keep up a list of famina relief works?

  —This is the list (hands it ia).
- 55. Q. They are almost all roads?-Mostly roads and tanks.
- 56. Q. Are the tanks under you ?—Yes, they would be, I think.
- 57. Q: As a matter of fact, there are a number of taukshere?—Yes, there are a great number in the district.
- 58. Q. Are these tanks excavated or made by bauding up the valley?—There are na valleys in the district that would be saitable.
- 59. Q. Are there any excavated tanks really large enough to irrigate any area worth speaking of I—They irrigate a few bighas round the tank, but there are very few of them large enough to irrigate uny extent of country. There are

- 60. Q. How deep?—That depends upon the reinfall. There are generally six or eight feet of water in them. Those of course are exceptional. There are numbers which would be three or four hundred feet square.
- 61. Q. Such as they are, are they worth having for the sake of the irrigation they do?—There is always a certain amount of irrigation done round them, but they are principally used for cottle watering.
- 62. Q. (Sir Thomas Higham.)—Last fomine there were a great many tanks dug in this district?—Yes.
- 63. Q. Are you in charge of mony tanks?—Only on the Triheni. In 1896 I had to do with some tanks, but after the first two months I was sont up to Ramnuggur on the Tribeni Canal and I had nothing to do with them.
- 64. Q. Have those tanks been any good?-They have been very meeful.
- 65. Q. Do they bold water ?- Yes.
- 66. Q. Generally for cattle watering?—A small amount of irrigation is done from them in addition to cattle watering.
- 67. Q. In regard to the Mosan pain, you say you recover every year from the people the cost of oil repoirs?—Yes. They have got to pay up before the work takes ploce. They have got to pay of the beginning of the year for the work of that year, and if there is any surplus, it is carried on to the next year and the eess would be reduced.
  - 68. Q. You moke an estimoto every year ?-Yes.
- 69: Q. Do you charge them anything for establishment?—They have to pay for a munshi and two or three peans. They do not pay anything towards my salary.
- 70. Q. And they do not pay anything beyond actual cost of repairs. They do not pay interest! No, none. They could not pay interest: it is their own money.
- 71. Q. What is the area that they irrigate?—It is about 60 square miles altogether, I should think.
- 72. Q. Sixty square miles is commanded by the pain? -Yes.
- 73. Q. How many acros? You say that 5,390 acros are irrigated by the Government works?—I am not sure whether the Masan pain has been entered in this or not.
- 74. Q. What ore the Government works?-The Ecdari or the Modhubund Canal.
- 75. Q. Have you any idea what the Masan irrigates?—I am afraid I have not brought ony figures down with me, but I could get them and seed them to you.
- 76. Q. What does it run to. I want an idea of the size. Does it irrigate two thousand, five thousand, or ten thousand arres ?—I should think ten thousand of least. The project, of course, has been improved and the irrigated 'areo will be increased.
- 77. Q. Whot do they pay for annual maintenance f—It was six annual last year; three annual this year. That is per ligha, or two aeres. Three annual is obout the average.
- 78; Q. What do you strike that on; on the area irrigated in the previous year?—Yes. We hove got to find out first of all if the people will toke the water, and thus, if the whole of the people who can get water could take it, the area they will get irrigated is estimated and it is struck on that.
- 79. Q. You strike it on the aree you think they will irrigate !- Yes.
- 80. Q. Do they put in applications?—It is something to that effect. We send round to them and ask them if they wish to take water, and then if they say "yes" we send them the amounts they have to pay.
- 81. Q. And if they say they do not want it?—We do not give them any water if we can help it.
- 83. Q. (The President.)—Can yoo prevent them getting water ?—Not in all cases, because the pains are not sufficiently well carried out to be oble to prevent water going
- 83. Q. Have you any legal power to stop them?—I prosecuted a man this year for stopping water and taking it into his field before he had paid for it, and he was fined.
- 84. Q. (Sir Thomas Higham.)—Do the areas they say that they are willing to take water for vary much from year to year f—They do somstimes.
- 85. Q. When they send in their applications they do not know what the year is going to turn out like? - No.

- rome tanks one thousand fect long and three or four hnn-red feet wide.

  86. Q. Suppose a man does not want to take water first. Mr. E. T. and wants to take it ofterwards, what happens?—If he paid Sealv. his whole assessment, we woold allow him to do thot.
  - 87. Q. You would not charge him onything extra?—I did chorge a man extra once. That was the same case where he was fined in the Court. I charged him double. But after all double does not come to very much.
  - 88. Q. I suppose you do all that on your own authority?
    -The Collector very often looks into these things.
  - 89. Q. It is done by your personal influence. You have no particular locus standi in that matter?—I have no legal authority of course.
  - 90. Q. You have no measurement of the areas at the end of the season?—No. We take the areas from the jama-
  - 91. Yoo say you work the lengths by rotation. Do yoo close them ?-Y cs.
    - 92. Q. You do not kove it to the people?-No.
    - 03. Q. That is oll chorged for in the cess? -Yes.
  - 94. Q. Has the Board onything to do with the matter? Nothing at all.
  - 95. Q. They do not odvance any money for it? -No.
  - 96. Q. But you are the District Board Engineer; ore you not? How did you come to have anything to do with it?—The Chairman of the District Board asked me to take it up.
  - 97. Q. You soy where there ore a number of these pains the people ore clearly complaints ngainst each other. Do you think they would like Government taking the management of the distribution into their hands?—I fancy in a great many esses they
    - 98. Q. You think it would be popular ?-Yes.
  - 99. Q. Is there much damage from floods?—Floods do very little damage. There is a considerable fall in the country, so that the floods run off very quickly. I have seen very little damage done by floods.
    - 100. Q. There is no water-logging P-No.
  - 101. Q. Do they run the water off during floods?—It runs from field to field until it gets into the drains.
  - 102. Q. (Mr. Rajaratna Mudaliar.)-Apparently the cess you talk obout is not levied under any enorment. It is a sort of mutual arrangement between the canal officers oud the tenouts who irrighte the lands?—It is a sort of arrangement between the Collector and the tenants.
  - 103. Q. Is the cess levied on the area actually irrigated, or on the area of the village?—From the area it is possible to irrigate. Some years of course when there is a short rainfall, and we find there is not enough water to irrigate the whole plot, we key the cess on the orea commanded. The cess is used for manoging the pain, and all that has to be paid for, so that we could not give it back even in a year when there would have been no woter.
  - 104. Q. This cess is in oddition to the water rate?—There is no water rate. They pay nothing else.
  - 105. Q. And the pains belong to Government?poins were originally made during the famine of 1897 as a fomine work. There ere o greet many other pains, however, with which we have nothing to do. They are entirely carried on by the zamindars.
    - 106. Q. So you do not levy ony woter rote of all? No.
  - 107. Q. The cess is proctically o water rate? The cess is simply for keeping the pains in order.
  - 108. Q. Is there ony objection to abolishing the cess and substituting a water rate?—I think there would be a great deal of difficulty in doing that. We would wont o large establishment for thot. The people of present are paying as lightly as can be done.
  - 109. Q. (The President.)—You estimate the eess?—The Collector keeps the money end I indent upon him as it is
  - 110. Q. Do you think that the zamindars would be willing to construct new pains if professional advice were given them as to sites end other things?—Well, it depends whether they are well enough off to corry on the work.
  - 111. Q. Could they not borrow from Government?-I hove no doubt they would do a good deal in that way if they could get the mensy from Government, and if further focilities were given to them for ocquiring lands.
  - 112. Q. The evidence we had at Bankipore was to the effect that there was greet reluctance on the part of

Mr. E. T. zamindars and tenants to take loans from Government?—I

Sealy. do not know enough about that to be able to give valuable

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113. Q. (Sir Thomas Higham.)—Do you know what was spent on the Masan pain?—It came to about Rs. 2,000; it might have been a little more. Its upkeep costs from Rs. 1,000 to Rs. 2,000 a year.

### WITNESS No. 20.-Mn. A. DUNSFORD, Moorla Estate, Champaran.

Mr. A. Dunsford. 27 Oct. 02.

- · 1. Q. (The President.)—I understand you are Assistant to the Manager of the Ramgurwa Concern ?—Yes.
- 2. Q. Have you had long experience of this part of the world?—No. I have only heen here about four years.
- 3. Q. You were not here in the last year of serious drought in 1896-97?—No. I was not in the Concern then. That was before I came.
- 4. Q. Where is the estate that you are employed in f-It is in the Motihari District.
- 5. Q. What do you grow there?—Rice and different kinds of pulses. It is a rice country mainly.
- Q. Have yon, from the time you have been there, been in want of irrigation P—No; we have been in no want.
   We have hunded this rivers ourselves.
- 7. Q. And this bunding of the rivers do you find it causes disputes with other zamindars?—Wu have no other zamindars around there. We have it all our own way there.
- 8. Q. Have you any trouble with the Nopalese hunding the rivers?—None whatever. The Nopalese cannot hund the Tilawe river: they hund other rivers.
- 9. Q. Are there any measures that you would advise or works that could be carried out which would improve the situation P—Mr. Harman has advised me to ask Government to grant us small leans for the purpose of making pains for taking water where it will not reach by bunding the river.
- 10. Q. Aud do you propose to make an application?—Yes.
- 11. Q. Have you ever done so hitherto ?-Not yet.
- 12. Q. Is it done hy others?—I don't know round that way at all. There is only one other factory near us.
- 13. Q. Ronghly speaking, above what amount of loan would you wish to have?—About Rs. 6,000.
- 14. Q. is that an indigo country at all?—There wes indigo there up to four yoars ago. There has been indigo there during the last 20 years until four years ago.
- 15. Q. How long does the water in the Trlawe last; all the year round?—Yes. It is a good rivor.
- 16. Q. Thore has been a proposal for making an irrigation canal from that river. The Concern you are in; has it got a large area of lands?—We have got about 36,000 acres.
- 17. Q. I see the project here was to supply water estimated at 200 acres which would give 10,000 acres of kharif and 5,000 acres of rabi irrigation. Would that be all in your zsmindari?—I caunot possibly say whether that would be only in our zamindari.
- 18. Q. Would you be buttered in your country by having a canal inid down there on eccentiful lines?—I don't think we would want a canal there, but only these pains.
- 19. Q. Of course, if there were a proper canal laid out professionally, it would cost money and there would be a water rate imposed?—It would entuil water rates on the rice. There would be sume difficulty about that. The rayats would make otherious to that.
- 20 Q. You think things are very well as they are?—Yes. All that really is required are just these pains.
- 21. Q. We have had evidence of its being desirable to have masonry sinices at the head of the pains. Do you think that is desirable?—I don't think so. I think just the pains only would do.
- 22. Q. Have you ever had any trouble with the pains being eited up just at the time when water is wanted?—No.
  - 23. Q. You keep them clean yourself?—Yes.
- 21. Q. (Mr. Rojaratna Mudaliar.)—We were told yesterday that in one place a pain, which was about 10 to 15 feet wide at the mouth, became enlarged owing to floods to 100 or 150 feet. In such ceses don't you think that masonry head-works would be of use in regulating the flow of water?—I cannot give you any information on that

- point. This is not likely to happon with na: the bund we make; the river would carry away before any more damage was done.
- 25. Q. In your pains don't floods occasionally pass down?—Occasionally. Our rivers spill over more or less nearly overy year.
- 26. Q. And cause dumags?—We get no damage from floods around thess. Damage is done more or less when the flood-water does not recede soon. The puddy submerged will not be damaged under 48 hours: it is not often it lasts longer.
- 27. Q. So that, so far as the estate in which you are employed is contained, there is no necessity for any masonry works?—None whatever.
- 28. Q. It was suggested by Mr. Oldham that legislation would be desirable to enforce upon the zamiadare the duty of keeping the pains in order; do you think such legislation necessary?—No, I don't think so. The zaminder himself sees that the pains are kept in order. There is no necessity for legislation in our part of the district.
- 20. Q. But; speaking generally as regards zamindars, Mr. Oldham's experience is that pains are very soriously usglected as also the ahars, and that legislation is very essential. What is your view?—Well, of course, judging from one part of the district, I don't consider it is necessary, but I cannot speak as to other zamindars.
- 30. Q. Supposing they were neglected, don't you think the Collector should have the power to interfore and compel zamindars to execute the necessary repairs?—I cannot give un opinion on that point.
- 31. Q. As regards the enhancement of rent, is there any difficulty in enforcing a claim on the part of a zaminder where he constructs works at his own cost?—I don't quite understand the question.
- 32. Q. Supposing a new pain were constructed by a landlord, can be onhance his ront?—No, he cannot enhance his rent.
- 33. Q. There is a provision of the Bengal Tenancy Act which gives him power to enhance rents where he has constructed irrigation works at his own expense?—I don't know. I cannot tell you that. When it is necessary to bund up the river for irrigation, the mysts practically do it; thousands of men turn out and help themselves and we supervise.
- 81. Q. In your estate, if you construct a new pain, you don't subance the rout?—No, we don't.
- 35. Q. Is the sharing (bhack) system in force in your zamindari?—We have both the bhacki and makdi.
- 36. Q. In the bhaoli system you get an enhanced shore of the produce on land converted from unirrigated to irrigated. In the nukdi system, suppose you construct a pain and give irrigation to the tenant, don't you lovy an enhanced cash payment?—There is no actual inercase in the rent. He would have to pay for the labour employed, but that would not affect his jamabundi. I don't think we have the power to increase that.
- 37. Q. If Government constructs a canni and supplies water to the zamiudari, would the zamiudar be willing to pay a water rate for the irrigation supplied f—In one instance I don't think so. We don't want a canni, and there would be no objection in irrigating the zamindari.
- 88. Q. Is there any portion of the zamindari which can be irrigated by any scheme which is now in contemplation?—I don't know whether there is any in the zamindari in our immediato neighbourhood. Wo only want a small loan for pains; otherwise everything is satisfactory.
- 30. Q. Do you think the rate of interest new charged on loans and the time allowed for repayment might be made more libural?—I don't know the terms.
- . 40. Q. 61 per cent. Is the rate of interest and a maximum period of 20 years for repayment?—I cannot give any opinion an until I have taken the advice of the manager. I am only here in his place. The manager considers 61 per cent. reasonable and 20 years generous.

# WITNESS No. 21.-MR. T. BARCLAY, Zasoiodar, Champarau.

With the permission of the President witness made the following statement:-

- "I shoold advocate the extension of the Tribeni Canal across the Sakrana river into a bhangar soil tract of 150 square miles; there is insufficient rainfall there and the crops often foil."
- 1. Q. (The President.)-Have you consulted the Superintending or Chief Engineer about this?-My brother, who used to he Manager, has been in correspondence with the Collector about it. My brother is in England on leave; he and I are partners.
- 2. Q. A note will be taken of your wish. Have you had long experience of this part of the world ?-30 years.
- 3. Q. As regards the pain irrigation, does it work smoothly?—We have bad no experience of pain irrigation.
- 4. Q. Are your lands not irrigated at all ?-No. We hove dove a little with pumps in years when there has been a small rainfall.
- 5. Q. If the Triheni Conal were extended as you propose, would the agriculturists take water overy year, or merely in one year out of five?—In some villages they will take it every year. This particular land heing biangar, the greater part of the land would he irrigated every year.
- 6. Q. As a matter of fact, up to now enlitvation has been carried on merely by reinfall f—Yos, and wells; a very small amount by wells.
- 7. Q. Is well irrigation popular among the people? Do they use it for rice?—No, it is used chiefly for opium and some other crops.
- S. Q. Did the cultivators apply for advances from Government at all for sinking wells ?—They applied to the Opium Department; it is a great opium district.
- 2. Q. Have you know much of the disputes as regards taking water from pains ?—I have had no experience of these pains at all.
  - 10. Q. Are there any ahars in this country ?-No.
- 11. Q. (Sir Thomas Higham.)—In this tract of 150 square miles that you spoke of do they grow rice new?—Yes, in the low-lying loads—chaurs.
  - 12. Q. It depends entirely on the rainfall ?- Yes.
- 13. Q. Have you any idea of the rate the people would be willing to pay for water for their rice?—No, I could not

- say. But I think Rs. 2 to Rs. 2-8 per acre for land irrigated would be paid gladly.
  - 14. Q. Have you any irrigation at all on your own estate?
    -None, except what we do by engines in a bad year.
- 15. Q. Is that done very largely ?—Last year I irrigated over 300 acree of land.
  - 16. Q. Do you pump up water for your tenonts ?-No.
- 17. Q. (Mr. Muir-Mackenzie.)—Are you quite confident of the soil of the Sokrana being suitable for irrigation?—Ae far as my knowledge goes it is the same soil os the Tribeni Cae al is made to irrigate.
- 18. Q. Is the soil south of the Sakrana similar to the soil of the Saran District ?-- I doo't know. I don't think it is.
- 10. Q. Yondon't think there is room for any considerable extension of well irrigation?—It might be done if this scheme is not practicable. If pains were made from the Sakraoo, they would have to raise the level as is done in the Gya District; there is the river which, four to five miles with huttresses, keeps the water up over the level of the country. No dealst that would be expensive. country. No doubt that would be expensive.
- 20. Q. With regard to wells, can yon say whether the number of wells has been greatly increased, in ony part of the district which you know, by the Opium Department?—
  The advances given by the Opium Department are not
- 21. Q. Is there any reason for the unpopularity?—A native gets a couple of hundred rupees and wants to spend it olsewhere, or if he speeds it on a well, he objected to repay it again, and I doubt if he gets long enough time in which he can repay it.
- 22. Q. I have read an interesting paper by Mr. Tytler, who was formerly in the Opium Department, chowing how he was oble to get over 3,000 pakka masoary wells made in Seron. I should like to get your opinion as to whether it would be possible to overcome the projudice?—It is difficult to say, but it might be done with a good officer who had his heart in hie work.
- 23. Q. You don't think there is anything in the soil or want of manure, or any other condition that would add to the difficulties of the person who tried it ?—No.
  - 24. Q. The soil is fit for irrigation ?-Yes.
- 25. Q. And water is not too far below the surface ?—No; only 15 to 20 feet in years with good minfall and at the first time of the year.

WITNESS No. 22.—Mr. R. G. KILEY, Officiating Collector, Champaraa.

(Replies to printed questions.)

The chief obstacle to private irrigation is the want of control over the distribution of water.

Most of the hill streams north of the Sokrena nro ntilized for irrigation purposes, and each of these throughout their courses have connected with them a series of pains to carry off the water to neighbouring villages.

The water is obtained by damming the bed of the river.

These dame are ewept away by the rains and bave to be

The making of these dams is generally deferred nutil the last moment, in the hope that rain will fall and avert the necessity for making them.

When a serious break in the rain occurs, and irrigation becomes necessary to save the crops, bunds are at once constructed.

These streams carry an extremely limited supply of

The chancels made to carry off the water for irrigation are extremely defeative; in fact, sometimes water is allowed to flow off through natural depressions where there is no defined channel. The result is that a great deal of water is wasted. These persons who have broods high inp the stream get practically all the water, while these lower down get very little. down get very little.

When a serious break in the rains occurs, there are frequent complaints made to the Magistrate that ench and such a person has made a new band, or has made a bund at a place where it had aver been made before, and requesting that it may be out. Local enquiries in such cases are

necessary. The Magistrate cannot always get out at once to enquire. Frequently complaints of this sort como cimultaneously frem different places.

Delay inevitably follows with often disastrons resulte.

The jurisdiction of the Magistrate in each cases is extremely limited. He can only intervene to avert a breach of the penec, and his decision most he based on the ground of immediate possession.

He has not got the legal powers to cettle these disputes satisfactorily.

when it is found that any one person is appropriating to his own use the whole of the water of any particular stream, the order that is generally possed is that he must make a jhanj and allow holf the water to pass on. This is unsatisfactory, as obviously those who have hunds high up the stream get a great deal more water than those helow. A jhonj can be easily tampered with. Anyone can etop it at night with a few basketfuls of earth. Detection in each cases is very difficult, and it is situated in the locality of people who wish tostop it and far from those persons living lower down the stream who wish it to remain open.

The thanj systom is in overy way unsatisfectory. A

The jhanj systom is in overy way unsatisfectory. A better system is of fixing dates on which yillages along the conrse of any stream shall be allowed to take water from it. This is deed in the case of Manan pain which is under the cootrol of the Excentive Engineer. Government has a right to the central of the water of this pain as it was constructed as a famine work. It is almost impossible, however, to indeed natives to accept this eyetem in other streams, and at present it is impossible to compel them.

Mr. T. Barclay.

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Mr. R. G. Kilby.

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Ben.

Mr. R. G.

The only way to do this would be to bring these streams under the Irrigation Act. They would then he placed under the control of an officer legally competent to arrange for the distribution of water and to dispose of disputes summarily.

This officer would be an irrigation expert, and would be able to point out defects in existing irrigation works and to suggest remodies. He would be able olso to prevent the construction of new irrigation obtained on unscientific

He would presumably be an irrigation officer connected with the Tribeni and Dhako Canols and would be oble to see that new privote irrigation works, or extensions of private irrigation works were made on lines compatible with the construction or future development of Government Irrigation Works.

What then is required is that as many of the streams now used for irrigation should be brought under the Irrigation Act as is possible. That these should be placed under the control of a European Engineer connected with the Tribeni and Dhaka Canols und residing for the greater part of the year in the locality. of the year in the locality.

In order to assist the extension of private irrigation works, it is desirable that Government should be willing to leud skilled surveyors and scientific instruments to persona vishing to moke private irrigation works at a reasonable

To essist private persons in the construction of approved irrigation works by lending money at low interest.

- 1. Q. (The President.)—You are Officiating Collector of this district?—Yes.
- 2. Q. Hove you been long connected with this district ?- I have been in the Bettiah Sub-division for some time.
- 3. Q. I gather from what you say in your note that there is no irrigation in Champaran south of the Sakrana?-
- 4. Q. They look with suspicion upon it? -River irrigation would be acceptable if it were possible; well irrigation is not acceptable; there is a prejudice against wells in the native mind; they say it alters the texture of the soil.
- 5. Q. In a paper by Mr. Tytler I have seen it said that private people look upon river water as being cold and laving no fertilising power; they prefer a juil or well?—I
- 6. Q. I suppose you have not been here during uny time of drought or distress?—No.
- 7. Q. You say in your note "there was famine in Champaran in 1566, 1673-74 and 1896-97"; have you any statistics about the total number on relief works?—There are statistics, but I don't happen to have them.
- 8. Q. I wanted them rather as a gauge of the severity of famine. Are the people north of the Sakrana in the habit of irrigating from pains every year or merely in years drought ? - Every year there is a good deal of irrigation.
- 9. Q. You propose that the pains should be taken up and excavated and treated in a professional and scientific way P—
- 10. Q. Now would the people, who hencefit from the pains, zamindars or rayats, he willing to pay, supposing Government were to depute an engineer to direct operations?—I think thay would prefer to be allowed to do it themselves under advice. I don't think that where they have upain from which they have been getting water for nothing that they would like Government to make a now pain and charge for the water. for the water.
- 11. Q. Of course you will see that one cannot have improvements without paying for them?—Yes.

  12. Q. One of the first improvements would be to build sluices or some regulating works at the heads of the pains?—I think they would be too expensive. I did not contemplate that; I meant levels should be taken first.
- 13. Q. You have sent in a very interesting paper us regards legislation required for the regulation of pains. Would you bring the whole of the pains under the Irrigation Act?—I think I would bring os many as could be brought
- 14. Q. That would be all the more important ones !-Yes, merely under the control of some one.
- 15. Q. Would the owners not resent it in some cases: men who had been doing exactly as they liked with their pains hitherto? -Yes, they might.
- 10. Q. You would give the Magistrato power to levy a cess for necessary works?—Very slight.
- 17. Q. I am afraid several of the difficulties you alluded to here, us regards breaching of dams, etc., could not be rectified without introducing massnry works, but you have not contemplated what you say?—No.
- 18. Q. (Ser Thomas Higham.)-You suggest that mensness would be most useful in taking up land and excavating pains. Are there any tructs of that sort provided for it your femilier relief programme?—I have been only a mouth in office and have not seen the programme.

- 19. Q. Is there u programme?—Yes. (Mr. Scaly explained that pains would be carried out as civil agency
- 20. Q. You propose to bring all the systems in which there are pains under the Irrigation Act!—Yes.
- 21. Q. Is that possible? Could you bring them under the existing Act, or would you require a special Act?—Only so for as they were connected with one of the Government canals (Tribeni or Dhake).
- 22. Q. Is money ever advanced for making pains or works of that sort?-No, I don't think so; not to my knowledge.
- 23. Q. Under the Land Improvement Act?-One could do it.
- 24. Q. They don't take advantage of it?-No, I don't think so.
- 25. Q. (Mr. Muir-Mackenzie.)—You have only been Acting Collector a very short time?—Yes.
- 26. Q. Where were you before that ?-I was Sub-divi-sional Officer in Bettioh.
- 27. Q. Had you any power to give advances?—Yes, under the Collector.
- 23. Q. Were powers delegated to you?—Yes, only one year; I should have had to apply to the Collector.
  - 29. Q. You did not apply ?-No.
  - 30. Q. Why?-It did not occur to me.
- 31. Q. The practice of giving advances has not been much developed in the district?—They were given generally when there was searcity.
  - 32. Q. But not in ordinary years?-No.
- 33. Q. What is the reason? Is it because the people would not take them?—Because they were not apposed to be required.

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- 31. Q. The Land Improvement Act has been very little utilized P-I believe so.
- 35. Q. If money were given in large sums to competent people, do you think something could be done?—Yes.
  - 36. Q. You think people would take the money ?-Yes.
- 37. Q. Is there any chance of land-owners or cultiva-tors combining to take considerable sums of money for the purpose?—It is very difficult to get them to combine.
- 38. Q. I nm particularly struck with this paper of Mr. Tytler's. He says the way in which he got wells dag was by getting the smaller cultivators to combine. Would you despair of doing that here?—I ennnot say really.
- 39. Q. Supposing you devoted your whole time to it and nothing clee, could anything be done?—Yes, probably.
- 40. Q. Would the people spend the money properly ?don't know.
- 41. Q. If 'you think it could not be spent properly, don't you he sitte to say so? Perhaps you feel that the thing is so new that you cannot say?—Yes.
- 42. Q. You mention as one of the obstacles to the 92. Q. 10m mention as one of the obstacles to the extension of private irrigation works "the uncertainty as to whether the lease-holders will be allowed to hold the lands irrigated for a pariod sufficient to recoup them for the expenses incurred." What remedy would you suggest for that P—All the land belongs to the Bettiah Ruj and the length of lease rests with them.
- 43. Q. Have these people not occapancy rights ?—No the people who make these things are tenute-holders.

- 44. Q. And the period of their tenure is limited? --
- 45. Q. Have you any suggestions in regard to the second obstacle—that of channels ?—Unless Government can assist them with land, I don't see anything else.
- 46. Q. There is no difficulty in getting hold of the land? -Yes, there is that difficulty.
- 47. Q. Government has not any power under the existing Act to acquire the land P—Not unless it intends to make the canal itself.
- 48. Q. Should power be given to acquire land for private persons P—No.
  - 49. Q. This difficulty is very hard to solve P-Yes.
- 50. Q. You say that "well irrigation is very little practised in this district." Is there any reason why it should not be practised ?-There is a local prajudice.
- 51. Q. Is there anything in the prejudice?—It has not been tested to my knowledge,
- 52. Q. (Mr. Rajaratna Mudaliar.)—Yon said just new you did not think was desirable to legislate for acquiring land in the case of proprietors who wish to construct irrigation works ?-Yes.
- 53. Q. Why do you think it unnecessary?—If Government acquired land, it would have to make the channel itself, and having made the channel it would require the persons who used it to pay for water.
- 54. Q. There are cases in which private persons are prevented from constructing pains owing to their inchility to nequire land. Do you not think it would be advisable to legislato to enable Government to step in to acquire the land?
  —I don't think the matter is of sufficient importance to call for legislation.
- 55. Q. There may be a pain which, if constructed, might servo a dozen or more villages and a single man steps in and

- causes obstruction; in such a case would you not legislate? Mr. R. G. -I think legislation would cause more harm than good.
- 56. Q. But the Collector would exercise his own good sense in the matter ?—I think there would be difficulties.
- 57. Q. Mr. Sealy referred to a pain constructed as a famine relief work, under which there was a small eess levied for the repair of the pain; are you acquainted with that work?—No, I have never had anything to do with it.
- 58. Q. Do you think there is any objection to imposing a water-rate on lands irrigated by that pain?—I don't see the necessity for it. I know nothing of the way in which it is
- 59. Q. Government has spent a lerge sum of money in constructing it; why should it not recoup itself for the outlay by levying a water-rate?—It was made for the good of the country.
- 60. Q. Is there any reason to forego a water-rate and charge only three annas a bigha?—I den't know that there is any special reason.
- 61. Q. He said some raysts were prosecuted who took water without paying the cess; do you know if they were prosecuted under any special law or under the Indian Penal Code?—Under the Indian Penal Code sa far as I remember.
- 62. Q. Are there any cases within your knowledge in which loans were granted for the construction of wells?— I know they have been; they were not advanced by me.
- 63. Q. Does the law in these provinces allow Collectors to grant remissions in cases in which there has been failure of wells? Do you remit a loan when a well fails?—No; such case has never arisen.
- 64. Q. Does the law contain provision to that offect?-I don't know; no remission has nover been chimed.
- [Mr. Allen roplying to Mr. Rajamtua Mudaliar. The Collector would no doubt recommend a remission. I den't remember any distinct provision in the law.]

# WITNESS No. 23 .- MR. C. STILL, Manager, Bettinh Raj.

- 1. Q. (The President.)—You are Manager of the Bettiah Raj ?—Yes.
- 2. Q. Have you had long acquaintance with this part of
  - 3. Q. Have you seen augthing of femine?—One great mins—the 1896-1897 famine—was beavy in our part of famins—tl
  - 4. Q. Do you think the country is better off now than it was in 1825? Is there any change in the circumstances? -No. I thick oot.
  - 5. Q. Is there auything you would recommend in the way of rendering the tract secure against famine?—I think a great undsrtaking is the Tribeni Canal; outside that tract there would not be much; most of the pains would be taken in in connection with that seheme I think there would only be four miles more that remains to be talked about in the Masan pain for instance.
  - 6. Q. Do you think it is certain that the agricultural classes will take water every year ?—Yes.
  - 7. Q. And that they will not merely wait for a year of drought?—I think after one year of drought they will certainly take it up.
  - 8. Q. Do you approve of this idea that has been spoken of of taking the Tribeni noross the Sakrann?—I don't know if there are any engineering difficulties. There is a tract which, if it could he irrigated, would be the better.
  - 9. Q. (Mr. Muir-Mackenzie.)-The seil south of the Sakrana is not fit for irrigation?—There is a tract which would henefit, but all would not.
  - 10. Q. (The President.)-It is good coough for cultivation?-Yes.
  - 11. Q. It has dry soil ?- Yes, I doubt if it would held meisturs; you would always have to irrigate.
  - 12. Q. You have had a good deal to do with pains ?--
  - 13. Q. Do you consider that the irrigation carried on by these pains is in a satisfactory condition, or could anything be done to improve them?—I think that I would leave that to private enterprise, assisted by Government. There might be an enquiry as to the coudition of these pains, and where it was found necessary to take them over by Government, that should be done, and lot the Tribeni Caual tako over tho halance.

- 14. Q. Where they are not working satisfactorily?—There are places where there would be disputes between the different people; in these circumstances I would give the Collector a little mere power to settle the matter; 27 Oct. 02. but would not allow any further interference with them.
- 15. Q. If there was a real improvement to be introduced into a pain, it would of course cost monsy; would the zamindars or raysts resent a cess being laid on their lands on this account?—I think the people who had been enjoying the proceeds of their own labour for the past 20 year would resent it. They would pay for extra improvements.
- 16. Q. Supposing it was a sluice at the head or a regulating wair ?—Woirs are very agreement. lating weir P.—Woirs are very expansive and could not be very well introduced; simply putting in head-works would not help much except to eatch a little silt.
- 17 Q. Is the Tribeni looked upon as a great boon?—Yes, I think so; the people understand irrigation and have done as much as they possibly can and wherever they can.
- 18. Q. (Sir Thomas Higham)—You think the best thing would be to help the owners of pains with advice P—Yes, after due enquiry In certain easos where disputes arise perhaps it would be better for Government to take them
- 19. Q. Would the preprietors not welcoms that ?not necessary in our part of the world; when the Iribeni Canal is completed it will take over the greater part of Champaran; that is snitable for irrigation.
- 20. Q. Would they take advances ?-I think they would for improvements.
- 21. Q. There are many on the same stream. Could there not be no amalgamation at the lower end !-- I think that might be done in certain cases.
- 22. Q. Would the people he willing to work it up and earry it out?—I don't think I should put much faith in the people. I should leave the tikadars to deal with the people themselves.
- 23. Q. Would the mineral people, do you think, combine to earry out any rational work?—Yes.
- 24. Q. Is it only want of money that would prevent them, or are there jeneusies ?—In Champaran there is one landlord and that facilitates matters very much; that is the Bettinh Raj; there is no object in acquiring hand; there the Raj would only too gladly give land free for the

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Still.

Mr. C. Still. 27 Oct. 02. improvement of the estate. In other estates I cannot say whether the owners are sufficiently interested. The Ramnugger Raj to the north will to a great extent he taken in by the Tribeni Canal. Any hill streams to the north of the Tribeni Canal might be enquired into us to whether worth developing for irrigation or not.

- 26. Q. Do you spend a largu sum on improvements ?-
- 26. Q. Not us much as there might be?—As much as we could afford perhaps.
- 27. Q. Would you advocate that extension south of the Sakranu?—Yes, provided there ere no engineering difficulties.
  - 28. Q. You would have to cross the river !-- Yes.
  - 20. Q. Would not that he very costly ?-Yes.
- 80. Q. And it is a question whether you could get sufficient water P—Yes, that is the great question; that partioular tractof country is the same as ut the north, i.e., clay soil.
- 31. Q. Can you say anything of these other projects to the west, the Tiluri and Passulf-No, I don't know the country very well.
- 32. Q. Ito you know the extent to which the Nepsleso interfere with the streams f—The hill streams we have to deal with don't come from Napal; the water-shed is on our side.
- 33. Q. (Mr. Mair-Mackenzie.)—Have you uny suggestions at all to make to the Commission?—No.
- 34. Q. (Mr. Rajaratna Mudaliar.)—If more funds were available, more might be done in improving irrigation in the zamindari?—Yes.
- 35. Q. Why don't proprietors take loaus from Government?—I fency it would be better to deal with our tikadarse; they are responsible gentlemen as a rule.
  - 36. Q. They might apply to Government?-Yes.
- 37. Q. Do you think the terms on which loans are officed are sufficiently liberal: 61 per cent. for 20 years ?—I think so; decidedly liberal.
- 38. Q. You don't think a reduction in the rate of interest or extension of period is necessary?—No.
- 39. Q. Still very few proprietors take loans from Government; what is that due to ?—I don't know.

- 40. Q. Is the black system maintained in your zamin dari ?-- No, the nakdi.
- 41. Q. Hue the zamindar power to enhance the rent where they construct irrigation works?—They have thu right to enhance rente if they construct works at their own cost; but it is not done.
- 42. Q. Have any irrigation works been constructed in the past 20 years in the zaminduri ?—Yss.
- 43. Q. Huve new works been constructed?—There is nothing very much. Mr. Moore ned Mr. Brocke mude pains and of course Mr. Coffin.
  - 44. Q. There was no unhancement of rout?-No.
- 45. Q. Is that due to any difficulty in the way of enhancement or to generosity ou the part of the proprietor?

  —They take their return in that they seeme the crops.
- 40. Q. Supposing the Triboni Caual wers extended to the zamindari, would the people be willing to pay water-rates?

  —Yes, after they had had sufficient experience of the value.
- 47. Q. (Mr. Muir-Mackenzie.)—You are of apicion that when the Tribeni Canal is made the district will be sufficiently protected from famins?—It would certainly protect the whole of the north of the district which is the part that suffers.
- 48. Q. De you think it would be protected so for that relief would be unnecessary?—I think oo.
- 49. Q. (Mr. Allen.)—Why is well water unpopular in Saran?—South of the Sakraou they object to thom.
- 50. Q. Have you made enquiries us to the cause?—I have made hundreds of wells at different times in the famine year. I experimented and found them very unsatisfactory. The amount they do for you is nothing. Tuo Opium Department is particularly interested in this. Immediately round villages villagers can irrigate their opium and their rice seed, which is very important. Where land is sultable, wells do for opium, as opium only requires surface irrigation and for rice seed for same ocasoos and that the regulated land is very small in area.
- 51. Q. Huve you heard anything ubent the use of well water in Champarau?—High lands don't take water us well as in the low lands as salts form. In the north of the Sakrann there would be no difficulty so fur us calts go.
- 52. Q. You have known that yourself?-Yes, in Saran too.

WITKESS No. 21.-ME. S. E. COFFIE, Zamindar, Sati-Bettiah, Champarau.

Mr. S E. Coffin. 27 Oct. 02.

- 1. Q. (The President.)—Have you long acquaintance with this district !— Yes.
  - 2. Q. Have you seen fumine in it ?-Yes.

3. Q. Wers you here in 1873-74?-I was not to Champaran.

- 4. Q. What measures would you recommend for rendering the district more secure from famine in the event of another failure of the rains?—North of the Sakrana the Tribeni Canal would do all that is required.
- 5. Q. Is there water enough in it for the whole district?—I understand there is.
- 6. Q. Is there water enough in the Tribeni Conal for all the land could be commanded f
  - (Mr. Horn.)-There are 2,170 cubic feet.
- 7. Q. Is that all that is likely to be required to meet the wanto of the place  ${\bf P}$

(Mr. Horn.)-I think so.

- E. Q. I mean if there was twice os much water would the canul he mude twice as large?
- (Mr. Hern.)—We have not contemplated these ex-
  - 9. Q. You have, I suppose, largely used pains?-Yes.
- 10. Q. And do the people use them in years of drought P.—Yes, overy year.
- 11. Q. From what you know of the country would it be desirable, do you think, to take these canals further than at present?—I ecrtainly think it would if there is enough water.
- 12. Q. Do you find things work fairly smoothly os regards irrigation from the pains?—Yes; I have had same diametes.
- disputes.
  13. Q. Are the rights of the different villages fully recognized as regards the amount of water they take? I

- precume the people at the top of the river can furn off the unpply from those lower down?—I have entire coursel an 't allow it.
- 14. Q. And as regards others, what have you found?—In the case of vilings where there are different fikadars at eve are disputes; very often they allow the water to go wasto rather than let it go down.
- 15. Q. Would the sitentien be improved and the water be better utilized if there were legislation f—As far as I know where this Tilbenl Canal is there will be no necessity for these small pains to the north of it.
- 10. Q. But you must come to the end of the Tribeni; how about the east? The Tribeni will be exhausted before you get to the end of Champuran?—I cannot speak of that part of the country; I am only talking of the part that the Tribeni flows through.
- 17. Q. What is your opinion about well irrigation? Has it any place in agriculture?—There is hurdly any well irrigation.
- 18. Q. Have you any practical knowledge of the land south of the Sakranss'-No.
  - 19. Q. The land north is all rice land !-Mostly.
- 20. Q. Do you think that that district ut least will be pretty safe once the Tribeni is in working order?—I think
- 21. Q. (Sir Thomas Higham.)—You have a good muny pains over your estate?—Yes, about 50 miles of pains.
- 22. Q. How many separate pains?—There are two main pains—one from the Pantai and the other from Muniari; the others are off-shoots.
- 33. Q. Do you require bunds at the heads of these? have to bund the river, in the first instance, to get water I usulu hund up the rains to rains the level of the water to fined the loud I want to irrigate.

Mr. S. E. Coffin.

- 21. Q. I suppose the brads you put in the river get washed away ?—Yes; it is very difficult to keep them in the rains, onless it is a very dry year.
- 25. Q. What is the depth of the river?—The Pantal is 150 feet.
  - 26. Q. Have you ever raised the question of putting up a permanent bund?—Yes.
  - 27. Q. There are no folling shutters?—No; it was thought too expensive; a kachcha hand costs very little, so it does not much matter even if it is washed away.
  - 28. Q. What is the arm you irrigate from these pains?— In a famine year I irrigate about 12,000 acres.
  - 29. Q. And in an ordinory year?—Anything between 4,000 or 5,000 acres.
  - 30. Q. I suppose the amount they will irrigate from the Tribeni Canal will not be more than \( \frac{1}{2} \) of what they will irrigate in a femine year?—In time they will take water every yesr.
- 31. Q. Do you make bunds every year?—I don't trouble about bunds in an ordinary year.
  - 32. Q. You only make bunds when there is great demand for water?—Yes, I give water for opinm and rabi every year.
    - 33. Q. Do you give them water for rice ?- Yes.
  - 31. Q. In ordinary years?—Yes; sometimes the hand stands.
  - 35. Q. When does the bund break?—It dopends on the rain in the hills: semetimes on the let of July, sometimes in Juoc.
  - 36. Q. They only get water for seedlings?—Yes, they put down seedlings early.

- . S7. Q. Are they all your tenants?-Mostly.
- 38. Q. Do you charge them anything for it?—No. I give it free.
- gove it tree.

  S9. Q. You get benefit from the predneo?—If they get n good crop, it enables me to got the rents in.
- 40. Q. Do you take your reuts in a share of the crop?—No, in each. I irrigate all my indige and other crops.
- 41. Q. When do you want water for indigo ?-I don't sow till the end of February.
- 42. Q. Do ontsiders pay for the water you give them ?—
- · 43. Q. Have you ony idea what they would be willing to poy for it?—I think they would pay me Re. 2 to Rs. 3 an acro. In a dry year they would pay me anything for it.
- 44. Q. In an ordinary year what is the difference between an irrigated and unirrigated crop of rice?—It would make a difference of 25 per cent in the value of the erop; in the case of rabi it doubles the value.
- 45. Q. How many waterings are required in the rabi?— Two to three.
- 46. Q. (Mr. Rajaratna Mudaliar.)—As regards the protection of these bunds, who orranges it, is it arranged by the zamindars?—Yes, with the help of the rayats; the day the river is to be bunded up they come in and give one day's help.
- 47. Q. What area is irrigated under these pains?—About 20 to 25 square miles.
- 48. Q. (Mr. Muir-Mackenzie.)—Would you be willing to take advances from Government? Would they help you?—I could not do anything more then I have done. I have got all my pains made.

WITMESS No. 25 .- Mr. E. F. GROWSE, Officiating Additional Commissioner of Patna, late Collector of Saran.

Note on Irrigation in Saran.

1. I bog to submit for the Commission's consideration a letter from Mr. Graham, the Officiating Collector of Saran, to the address of the Commissioner, and dated 21st instant, which puts the case from the local point of view.

I would wish however to add the following remarks:-

- 2. The Saran Connis are not and con never he made a productive work. The conditions of rainfall and of the district generally prevent this. But they should be regarded as a protective work in years of seanty rainfall, and as a conitary work also, and with this latter object in view, should be maintained open all the year round, in all years.
- 3. They should be, if possible, improved. It appears from Mr. Hern's note that the initial difficulty is the uncertainty of the emply of water in the seas or byechannels of the Gandak from which the canals or rather canalized rivers are fed. He also says that there is a great danger of these channels being left dry owing to changes in the coorse of the Gandak.

This is of course a question for the engineers; but it would seem that improvement of the source of apply is not impossible, and at any rate even under existing conditions at certain seasons of the year an almost unlimited supply of water can be led into the canals, and perhaps this could be held up and regulated instead of being allowed to flow out at the other end into the Ghagra or Gouges.

For this purpose weirs or regulators will be necessary at intervals.

Siniees will also be necessary at the many existing outlets from the canels, and facilities should be offered to private individuals to construct channels, and, if required, to acquire land for the purpose, to act as distributaries.

- 4. It is not improbable that this scheme would be more feasible on the two western counts—the Daha and Gandakl—for the supply of which water seems more readily available than in the case of the Dhanai and Ghangri; and it would enhonce the valoe of the scheme if the Jharahi river, which lies still further west of the Daha, could be connected with the Gondak in the same way as the Daha and similarly treated. The Jharahi is at present a singuish stream from which irrigotion is practically impossible owing to its steep banks, and the neighbourhood of which is particularly unheelthy and malarious. It runs for nearly 20 miles of its centred in Sarah through the Hatwa Raj, but leaves the Gandak at a point in the Gorskhurg district
- leaves the Gandok at a point in the Gorakhpur district.

  5. If the canal system is improved and extended the next important point is the question of recompment of cost

- to Government. I do not think it wise or equitable to attempt to recover the 7 lakhs already expended. The benefits have been barely sufficient. Neither would I attempt in any case to recover by means of a water-rale, because in many years no water would be taken, and also because of the great difficulty in measuring up and assessing the water taken for watering rice, which experience abows would often be benefited by irrigation in September and October when the hathiya rains fuil.
- G. I also consider that it would be difficult to levy a cess on the awners or occupiors of the land benefited only. It would perhaps be possible to define the aren protected, and levy a cess on all lands within this area; but the definition would lead to codless objections on the part of those whose lands were on the boundary, and increase the Collector's difficulties considerably. It would also be unpopular, and, although perhaps strictly equitable, would seem invidions. It would also require legislation.
- 7. The embankment coss levied from all estates in the Saran district for the maintenance of the Gandak embankment, although all estates are not equally benefited or protected and many are not protected at all, affords a precedent for a general coss such as I would advocate. I would in fact regard the embankment and canals as one system. It is the construction of the embankment, that by closing the mouths of the drainage channels, has rendered the canals a necessity, and the lutter are direct resolt from the former. Such being the case, I would increase the embankment cess by a sam sufficient to pay a small percentage on capital outlay, and to cover working expenses. Even if nothing more were done to the conals I would recommend this, but presume to urge that their extension and improvement is essential out the lines roughly indicated in the estlier part of this note.
- 8. I may add that the improvement and extension of the existing canal system is necessary, in order to permit of the execution of the various small schemes—some of which have been referred to in Mr. Simkins' note—for opening out for both irrigation and drainage purposes the many old drainage channels in the district as protective works.
- 9. It is unfortunate that a fresh contract for 20 years has recently been completed with the zemindars to pay embankment cess. But it would be possible to ascertain whether, if the improvements and extensions are made, they would object to a revision of the contract before the expiration of its term, and if not work could be started. The advantage of adding the canal cess to the embankment

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cess would be that no legislation would be required, such as would be necessary if a separate canal cess

would be necessary if a separate canal cess were imposed.

10. The question of centrol arises. If things are left in statu gno, it would probably be best to hand ever control to the District Beard, which is a representative bedy. But in that case it would be extremely hard to throw upon the District Beard the burden at providing out of its existing revenue the cost of maintenance. It would be hardly fair for Government to get rid of its responsibility in this way by transferring the charge from Provincial to Local revenue. At the sume time it would not be advisable or very useful to give the District Board power to sell the water. This would lead to endless difficulties, and would of course merely mean that in the end the Collectar would have to assess and callect the rate. Perhaps some arrangement might be made by which the Pravincial Government and the District Beard should share the cost of maintenance, the latter supplying the the Privincial Government and the District Board should share the cost of muintenance, the latter supplying the central, until the next revision of the contract for the embankment cess, when the cost of maintenance of the canols should be added to the cost of the maintenance of the embankment, and collected by Government—as much of the praceeds as represent the former being headed over annually by Government to the Beard.

annually by Government to the Beard.

11. But if the sistem be improved and extended at the cost of considerable additional capital antlay, I me doubtful whether a local body like the District Beard could be well entrusted with the duty of control. It might be too big an ondertaking and might necessitate a special stuff so large as to require too much of the District Engineer's attention and swamp other work. At the since time I do not feel disposed to give up the idea entirely. It will be necessary to wuit and see what the Beard's responsibilities will be.

It would seem that although section 53, clause 8 (1) of the Local Self-Government Act forbids the construction of any channel from District Board funds for the purposes of irrigation, there would perhaps be no legal objection—after due notification by the Lacotenant-Governor—to make over the council of such channels for sanitary purposes under section 88 of the Act. The fact that they would be used for irrigation could not affect the question as long as Government is content to give over its right to control.

Of course in this case the proceeds of that portion of the embankment cess which represents the additional cess for causis must, less cost of callection, he made over to

Copy of Mr. Graham's letter dated 19th October 1909, to the Commissioner.

With reference to your memurandnin No. 5101 G, dated 17th October 1902, forwarding Government of Beogal's letter No. 21 T. R., I have the monour to submit below the names of three gentlemen whom I have selected to appear as witnesses before the Irrigation Commission on the 23rd und 24th October :

Mr. J. D. Macgregor, Arrowah Concern. Mr. M. Mackenzio, Burliega Concern. Mr. G. Penn Sunkins, District Engineer, Saran.

Mesers, Macgregor and Mackenzie are Indigo Planters of experience and will be able to give evidence from the point of view of the planting community, while Mr. Simkins is thoroughly acquainted with the district and will be able to represent inatters from the point of view of the District Brard as well as from an engineering or professional course of view of sional point of view.

- 2. I am also forwarding a short note by Mr. Simkins dealing with certain irrigation projects for this district which are under consideration.
- 3. It is a matter for rogret that Saran was not included 8. It is a matter for regret that Saran was not included in the tour programme of the Irrigation Countle-iun since both its din-ity of population as nell in its circumstances of soil and climate indentically entitle it to consideration. I trest, however, that the Commission while it Bankipur will be able to devote a little of its time to the discussion of irrigation projects for this district and will place on record noy conclusions which may be arrived at. I have purposely restricted the number of witnesses selected by me to three though more could easily have been obtained because I see it is anticipated that not more then four witnesses will be examined in a day. witnesses will be examined in a day.
- 4. The history of Samn uffords a very excellent illustration of the danger of meddling with nature. Some time

in the last contary (the first mention of it is on records of the year 1790) what is known as the Sarau embankment was boilt in order to save the district from floods, and this was boilt in order to save the district from floods, and this object no doabt was accomplished, but nt a cost which would certainly have caused its promoters to hesitate could they have foreseen the results. For though the oxclusion of the Gaudak water doubtless prevented the recurrence of floods it caused an entire change in the drainage of the enuntry the effects of which are still distinctly visible. For whereas formerly the Duhe, Dharai and other water tourses were fair-sized rivers pourling a large volume of pure fresh water through the district and navigable some of them for large boints all the year round they are now only sluggish stienms, and in fact during the greater part of the year are a mere series of staguant unlarious pools the neighbourhood of which is so notoriously unhealthy that peeple do not like to live near them. In short the crection of the embaukmunt effected what was in reality merely an exchange of evils. It secured the district from errection of the embaukment effected what was in reality merely an exchange of order. It secured the district from danger of fluods, but rendered it liable to a still greater evil, viz., draught. There can be no doubt that the character of the district was to u great extent altered by the oreestion of the ombankment and as time went on and this was more and more realised Irrigation projects on a large scale were brought forward. These prajects by strange irony of fats seek to restore by artificial ascans what was the natural state of things money years previously, i.e., before the er-ction of the Gandak embankment. They do not however step there. They seek something more. For while they seek to bring the water of the Gandak into the district they aim at doing so in such a way as to effectually irrigate the whole district while incurring no risk of inundation. In other words what is wanted in Saran is a well regulated supply of water which will secure the district ngainst fear of drought without rendering it liable to flood.

5. As regards supply of water Simm is particularly

flood.

6. As regards supply of water Simi is particularly favorably situated since the Gandak at certain times of the year is capable of furnishing an illimitable supply, and all that is required a to regulate and distribute it. I propose to consider very briefly how far attempts to regulate and distribute it have succeeded in the past. But before dulag this I must say a word or two as to the need for irrigation. As regards this there can, I think, be no two opinions; the annual mainfall of the district is a very short one, riz., 40 89 luches only, and experience shows that it has a tendency in fail periodically with a mealthing wide-sprond in partial failure of roops. There were faminate in this district in 1806, 1874 and 1890 and partial failure of crops is a by no means necommon thing. Judigo, rice, tins distinct in 1800, 1874 and 1870 and pritist infinite of orops is a by no means nucommon thing. Indigo, rice, maize and other crops fequire a constant supply of water, especially rice, white the rabi crop, most important of all, needs a sufficient amount of moisture in the soil in order to be a success. If a properly regulated supply of water could be ensured failure of crops would be an unknown

ندمة

thing.
6. Unfortunately the history of the Saran canals has been a history of misurar agement and sailure. The iden of the Gandak which had belting into the district the water of the Gand & which had proviously been excluded with soch care seems to have first urbsen in the seventies, by which thee no doubt long experience had shown conclusively that the Saran embankment had not proved such an numbered blessing as was originally satisfacted. In 1876 two planters of this district, Mesers. D. Reid and F. Murray, began to again for a canal scheme io order to sayo the craps and it was ultimately decided after a good deal of discussion to adopt a scheme consisting of the following works: the following works :-

Head cut with shince at its head from Sissua to Bijarpur, 61 miles in length.

Feeder channels from the Enpau-Chap-Sota to the following new sluices :-

1. Dalia. 3. Dharai. 1. Daha. 2. Gandaki. 4. Gungri.

These works were rarried into execution on a guarantee The administration and working of these rainals lowever was a failure from the commencement and thu chief couclosions arrived at may be stated as fallows :-

(1) That the agreement between Government and the guaranters needed revision as the condition that "the guarantee should be paid if water is supplied in the casels in all the moeths of the year is almost an impossible our to carry out 'ou my system of canals, and specially on the Saran Canals."

(2) That it would be nurise to spend more money on the canals as the source of supply is not to be depended on.

- (3) That an unpaid administrative staff is n failure and cannot be relied on. When a new agreement is enfored into provision should be made for a proper staff to prevent surreptitions banding of cannals. Collections should be made if possible by the Collector.
- (4) That the schome is imperfect, though it bonefits the guaranters and is worth more to them than the sum senually paid by thom, i.e., Rs 21,750.
- (5) That Government is a lover to the extent of about Rs. 30,000 numally and the grammate should be increased by that amount or other errangements made to cover the loss.
- 7. The above conclasions are taken bodily by me from a report on the Saran canals by G. W. Faulkner, Esq., C. E., written in the year 1885, and there is no dealt whatever that representing as they do the results of octual experience they would be of great value if the question of irrigation were seriously taken up again. It is to be remembered however that the position has very much changed since that time, and that the Indigo industry which was then fleurishing and able without dithoutly to guarantee a word bed state nod would certainly not be prepared to guarantee even link of that same.
- 8. Under existing conditions n guarantee would hardly be feasible and the best plan new would probably be to pay far irrigation works by means of a small canal cess. A proor two in the rupec would be sufficient and the tax would not be an emprephilar one since it would confer a benefit which would be appreciated by all classes.
- which would be appreciated by all classes.

  9. The second conclusion mentioned above, viz., that "it would be unwise to spend more money on the casals, as the senice of supply is not to be depended" has hardly been borne out by experience. Experience shows that if the causle are opened at the proper time, i.e., during the rains and before the water in the sola has fallen too low any quantity of water can be obtained and the cost of bringing it into the district is insignificant. But, and this is the most important point of all, it is no use being satisfied with incredy bringing the water late the district. There must be a system of proper regolators at every four or five miles in each of the causlised rivers and a system of channels for distributing the water. Otherwise it merely comes in at une end of the district and goes out at the other and accomplishes very little good.
- 10. Of late years there has been no systematic working of the cacals at all, but it has been the custom to apply to Government to open thom whenever the prospects of the crops appear to be in doubt. This too is a direction in which reform is required for the direct central of the canals rests with the Fublic Works Department which rightly or wrongly has gained a repatation for obstruction. The funlt however has not so much with the Public Works Department as with the system which makes the cost of working the osaals debitable to the Public Works Department while it provides no special fund for the purpose. This is the secret of the Opposition which has been met with in recent yous for the Public Works authorities.
- 11. Then touit has been a general subject of complaint that when the canals are opened they are mismaleged. Water is not let down then in sufficient quentities and just when it is most wanted there is none available because cross bunds have to be created in the sota and the Public Works Department refuse to make them until the cost is goaranteed.
- 12. There can be no doubt that the teaching of experisace is clear on two points, viz.—
  - (1) The cost of opening the canals should not be debitable to Public Works Department funds. The money should be provided in some other way and should always be available in case of emergency.
  - (2) The notual control as distinguished from the charge of the conals should rest not with the Public Works Department, i.e., with some high official in a hill station many miles from the place itself but with the district authorities who are on the spot and are in a position to know exactly where irrigation is required. Prompt action is everything and the present system has been found to be anything but prompt.
- 13. The chief arguments to be urged in favour of improving the Saran Canals are as follows:—
  - (1) Insurance against drought and consequent failure of crops.

- (2) From a sanitary point of visw the flewing of a Mr. E. F. volume of pure fresh water through the various streams in the district is an excellent thing. It seems them oot, provides good drinking water for the people, and renders the banks of the rivers habitable with suffity to health which they certainly are not now.
- (8) Thirdly, it is a recognised fact that the opening of the canals has the effect of raising the spring level throughout the district, which gives the moistore in the roil so necessary for the rabi crop. It, at the same time, raises the level of all the wells—in itself a very great hence indeed.
- 14. I think there can be no doubt that the opening of the canals oven as they have been warked this year is a great boon. From one or more of the points of view above mentioned, and oven if neere elaborats irrigation projects are found to be impracticable I think that it would be a good thing if the canuls were opened as a matter of course overy year at the season when it can be done with least expense. There is nothing at all to be lost by opening them, and on the other hand there is much to gain. The cost is trifling, if done at the proper time and might conveniently be met by the District Board who could provide for it annually in their Budget being recompensed in return by being vested with the central of the canals. This would certainly be a more satisfactory arrangement than the present one.

#### Copy of Mr. G. Penn Simkins' letter dated 9th October 1902, to the Oollector.

With reference to Commissioner's No. 5176, dated 26th September 1902, I beg to hand you herewith a note on Irrigation works in our Famino Rellef Programmo. The particulars of the surveys of two projects, referred to, I will send you as early as possible.

#### Irrigation Projects.

The bulk of the so-called Irrigation projects in the Famine Relief Programme for the district consist of small works anch as cleaning out and re-aligning existing cuts and pains taking off from the local rivers and leading to and from chains; these cannot be looked upon as Irrigation works except in a very small way. Real Irrigation works are such as will, after construction, either materially improve a certain nrea of country or act as reliable preventatives of famine ar seriety, in the event of a failure of rainfall, etc. Of such works there are only three in our present pragramme, viz., eacal from Mahair Chaur to the Hardia Chaur, channel from Ambicapur to Daraunds, via Barharria (30 miles in longth), channel from Gandaki to Awasta (25 miles long). Of none of these have we, at the time of writing, any actual working particular. A has, I am given to understand, been surveyed through the agency of the Public Warks Department and a report is under consideration. B, Mr. Hatchins of Tagapor, the proposer of the works, gives some interesting details in his letter of 14th July 1902 and a reconnaissance survey is in hand. C, we have no data, but I have put lu hand a reconnaissance and will be able to give some information on both surveys in a week or so. Other works which might, with great advantage, be entered in the Dietrict Programme of Rolief Warks are (1) canal from Nugra to Chupralı, (2) canal from Chiránd to Gurkha. No. (1) is a work which would be of great benefit and by no means difficult of cenetraction. There is, at present, a sluice on the Gogra at Chupralı and all that is required ie a weir under the Roail Bridge ut Nagra and a sluice to control the water in the Gandaki, where this canal excavated the supply of water to the chaurs to the north of Chupralı would be assured; this yem owing to the latences of the rains, these chaurs are only about half oultivated; had a canal existed, water from the Gogra could have easily been passed on to them and so have serared a full crop. No. (2) would also be n most

As mentioned above, the other Famine Relief Irrigation works are the clearing unt and re-aligning of small drainage and other clumnels; these all depend for their usofulness an the actual working espacities of the various cannilized streams in the district, and I am afraid till some practical system of rendering these streams more useful than they

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are at present, is adopted, the usefulness of the small auhsidiary channels will be mil. The opening of the Saran Canals may do good to a certain limited area of country, nlong the upper reaches of the canalized rivers, but the benefit to the district as a whole, obtainable from them us worked at present, ie very restricted; where due armagements made for the conservation of the water, which is let down the local rivers, then the utility of those channels and pains would be great, but as matters stand they are of very little practical value. Except perhaps as works giving

occupation to a certain number of workers in times of searcity, which really ought not to oxist. A very good example of what can be done is seen at Dhangaraha on the hiver Dhana, where woir was put in some verre age by private enterprise, the existence of which has supplied the means of prigation to a tract of country extending nearly 5 miles long on both hanks of the stream; what has been done at Dhangarobn could, I believe, he doce at other places on the vorious rivers, with equal advantage.

- 1. Q. (The President.)—How long have you heen in this part of the country?—Two years and four months. As Collector of Saran, until July 1st of the current year.
- 2. Q. Havo you had pravious experience of this part?-Not of North Bihar.
- 3. Q. I say that the whole district is shown as liable to famine?—That is in the "famine programme" submitted to Government, but I would modify that by saying that the whole district is liable to scarcity and distress, and that some ports of it are liable to severe scarcity and femine. It is difficult to define which parts. The phrase quoted is an over-statement.
- 4. Q. Whot do you consider the hest measure to take for this district to minimize famine?—The hest, I can think of, is to improve the existing system of the Saran Canals, by which we can get a larger supply of weter down the canals, and, when we have get it, to regulate it.
- 5. Q. These Saran Canule are closed altogether now?— Practically. They were opened this year during the last cold weather ufter pressure had been put on by the local authorities.
- 6. Q. What irrigation are they calculated to dof —They are sold to be uhls to do about 64,000 acres, but the most ever done was in the year 1884-85, when they did about 21,000 acres. Perhape they could do ahout 6,000 or 7,000 more. The difficulty was with the working of the canals. That water was not received when it was wanted. It was the complaint of the local planters. The canals were constructed after the famine of 1873-74, and they were opened on a guarantee given by certoin indigo planters. Money was received from Government direct and from the plantors, and they recovered from the rayuts who used the woter, and they also used the water for filling their tanks, etc. But it was an nusatisfactory errangement to everyhody.
- 7. Q. The theoretical maximum might run up to 64,000 acres?—That has been stated. We have 72,586 acres of well irrigation. The former figure is taken from the survey, but the latter is made by merely multiplying the number of wells by a certain figure, and I doubt if it he correct. They have multiplied by four. There are 27,000 and mosoury wells and 3,000 add kacheka wells.
- 8. Q. That is not an extravagent calculation for the agreege of wells?—I doubt whether they do quite so much. I think three acres each would he a fair estimate.
- 9. Q. How do you recommend that the Saran Cauale should he administered in the future? Should Government take it over at once as an imperial work?—No, it is far too amell u thing. It would be hetter if it could he improved and ufterwards handed over to the District Board to work. I do not imogino the water would be taken every doy for irrigation. Saran is u big wedge hetween the Gogra and the Gaudok, and the Saran emhankment runs along the south or right hank of the Goudok and was constructed a good deal more than a hundred years ago and was token over by the Government at the end of the eightcenth century. It was constructed to protect the whole district from flood; in eo doing it closes the mouthe of the spill channels which come scross the district from the nerthwest to the south-east. They take their rise in the Gaudok mostly. By closing these spill channels, noturally the water received by these channels which are small rivers has heen very much roduced, und whereas there was deep water io most of them and novigotion, practically no hoats con go along them now. In many years we do not want irrigation from these rivere; hut when we have a yeer of drooght, every drop of woter in the district is ntilieed and the cultivators are very olever in ntilising water in every possible way; and now that the obannele which form the eo-called canuls are closed, it looks like a ein that the water cennet be got down when we want it.
- 10. Q. How do you get the water from the rivers on to the lond ?—By lift; there is no flow.

- 11. Q. If these conals were improved, they might he really a source of value to the district?—Distractly.
- 12. Q. What do you propose? That a Government officer, an engineer, should be sent to thresh out what can be done and to prepars a scheme which Government should carry out and make over to the District Board?—Auother idea has been suggested that the District Board should be given the power to construct the works.
- 13. Q. With what money?—Borrowed from Government. But I am not personally in fuvour of that.
- 14. Q. I suppose it is possible that if it were done, the works might be on a lurger scals and more irrigation done?

  —Yee. But we should not want much larger irrigation except in a few yeors. Another bouefit, which would arise, would be the raising the level of the water in the wells oll along this tract. It is a known fact that when the counls were opened regularly, even with the flow of water that they then gave, the well level was raised four or five feet in usighhourhood, and that is a very great consideration. Secondly, there is the sanitary consideration. At present these channels run quile dry after the rains, and they become mersly a series of molorious pools, and if we can hold the water op by small wors in places, we can henciit the district from a canitary point of view. The banks are uctoriously unheelthy. The river Jharabi chould also formpart of the ocheme.
- 15. Q. At present there are really four schemes independent of each other?—It is one scheme. They all come from one river.
- 16. Q. But the making of one does not imply the making of another. They each etand on their own bosis?—Yes, but with all four it would be very much better.
- 17. Q. Why were they closed?—Because of the difficulty of finding momy to keep them open. Government insisted that before they were opened a certain guarantee should be given and subsequently certain other rules were derised by which on individual wishing to have them open must put down a certain eam of money. No one will come forward and do that now. The indigo industry is not flourishing now, and the only people with suterprise are the planters; the zamindars would not combine for that. The Hutwa Raj which owns most of the northern part would, but they would work it entirely for their own henefit; it would not be a public thing. The cost of constructing and maintaining these canals has fallen and will fall on Government, and noturally Government requires to secure this money, and thus the question of recouping this money arises at once.

7.E.

- 18. Q. Would the cultivators of that tract be willing to accept a cess P.—Not the cultivators; they would pay, prohably, if it were ordered, but I would propose a cess on the comindar.
- 19. Q. They might kick agoinst it?—If it were not a very large one, there would he no great opposition especially if they were to recover half of it from the rayat us with the nond cess. Or, looking at it as port of one scheme with the emboukment on the ground that hut for the omhaukment the canals would not be necessary, and thue regarding the embaukment and canals as one protective system, there might be one cess. That is to say, that a small water cess might be odded to embaukment cess and levied on each estate in the district, whother actually protected or not by the cenals. The cess hos already been levied in this form by contract eince 1881 when Sir Antony MacDonnell was Collector of Saran. It is about Rs. 23,000 a year only on the whole district.
- 20. Q. To corry this out it would he, I suppose, a case of a tolerably severe cess until the work was done, and then a light cess for maintenance afterwards, or are you prepared to borrow money from the Government to epread it over more years?—Counct Government he content with interest? We could have a cess to cover Government interest and cost of maintenance perhaps.

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- 21. Q. You think they would take the water every mins and crops?—We should probably never be likely to year?—Not all. In some parts, as in the Hutwa Raj, they get anything more severe than the 1896-97 famine would take it for their rice nearly every year. year?—Not all. In some parts, m in the Hutwa Kaj, they would take it for their rice nearly every year.
- 22. Q. In what part of the district is there most well irrigation?—Pretty well all through the district.
- -23. Q. The district is not given up body and coul to rice?—No; the rice is about 25 per cent. only. The most important crop is the rabi.
- 24. Q. Are the wells on the increase in number?-I should say they were.
- 25. Q. Have you been asked for takaci advances ?-Not since I have you been asked for tokatt advances r-Not since I have been Collector. The Opium Department have done a good deal in that way. The Hutwa Raj has done something and will probably do n great deal, more. Every year it gives advances for the purpose.
- 26. Q. Have you had any forecast estimate of what it would cost to put these channels in order P-No. I do not look upon this at all as a productive work, but merely as a protective work against certain had years, and over a period of 30 years there have been four years in which we have had to spend money in relief somewhere in the district in some form or other.
- 27. Q. Have you any laud in your district, the right bank of the Sandak, where the people object to irrigation; think that it deteriorates the land ?—No. There is a general iden—"once irrigate, always irrigate," but that is the only four. They use well water all over the district.
- '28. Q. There are a number of dog tanks, appurently, in Saran !—Yes.
- 20. Q. Do they make any appreciable effect on the irrigation?—They are not of much value; they are so small. They irrigate wheat, harley and augurenue considerably and all market garden produce and opium.
- 30 Q. Wenld you advocate the encouragement of wells !- Yes.
  - 31. Q. Is opium extensively cultivated P-Yes.
- 32. Q. (Sir Thomas Higham.) Ijunderstand that whon these channels were first opened they were handed ever to the planters. Were the planters responsible for their maintenance?—No. They took the water, distributed it and paid . for it.
- 33. Q. Why was not that arrangement satisfactory? wend rather other witnesses answered that question. It was not here at the time. There is a certain expense every year for cross bunds, etc. They used to say that the maintenance, including establishment, cost its. 30,000 a year, and the last low years it has cost about its. 6,000, I think. No one personally will come and put down Rs. 6,000. That is why they were closed.
- 34. Q. You cannot put on the cess with the law as it stands; can you?—Yes, if the zamindars would agree to add it to the embankment cess, and I do not see there would be much difficulty about them. The only practical difficulty is this that the embankment cess contract has new 185 years to run, because we have just started a new contract for twenty years.
- 35. Q. What is the contract?—An estimate is made of what it will cost the Public Works Department to maintain this embankment during 20 years. That is divided by 20 and the sum annually recovered from the zamindars.
- 36. Q. Is the number of wells increasing every year ?-I think ec.
- 37. Q. Do you make advances for them?—No; a few advances may have been given in 1896-97 by the Collector; but advances are continually given for this purpose by the Opium Department and the Hutwa Rnj.
- 33. Q. Only for the cultivation of poppy ?—Yes, in the case of the former, but not in the case of the latter.
- 39. Q. If you had welrs, would you charge for each watering P-No; it would all be covered by the cess.
- 40. Q. So some people would got the beacht of the woirs and others would pay for them. Those weirs confer a special benefit on a certain number of proprietors near them; that to scene them is the only possible way to put a cess over the whole district?—There is naother method to estimate the area protected and have the cess realised from that area. That would be more equitable, but difficult.
- 41. Q. (Mr. Muir-Mackenzic.)—Do you consider the district is likely to be exposed in any year to very acute famine? I see the numbers in the 1874 famines were exceedingly large. Do you consider the 1896-97 famine was absolutely as severe in failure of

- 42. Q. What will be the total area which this system of 27 Oct. 02. onnole would irrigate: 20,000 nores ?- A great deal more than that. It might be a hundred thousand, but perhaps net.
- 43. Q. That is in addition to the 72,000 already?—That is private enouls; I don't know what those figures mean, but believe they refer to existing drainage channels improved by certain landed proprietors such as the Hatwa Raj, and some indige instories for irrigation, but these are largely dependent on water remnining in the canals or channels which are now closed.
- 44. Q. Are there any instances of extensive areas being irrigated by wells P-Not in Saran.
- 45. Q. What is the crop : highly intensive cultivation highly manured P-Generally in the neighbourhood of villagos.
- 46. Q. Do they over irrigate wheat ?- Yes ; but not in a year of good moisture.
- 47. Q. Arothe wells worked with bullocke or lover ?-Both; tae lever mostly.
- 48. Q. According to the figures here the area under irrigation is about a half?—It must be mere.
- 49. Q. Woold a third be protected in a bad year ?-That would not include the Denras irrigated by the spill from the river. Last year, when there was considerable want of moisture, the rayate were making kachcha wells very considerably.
- 50. Q. Do you think a large extension of welle is possible in that district? Would there be difficulty in finding manure or money to make the welle? Could they be doubled ?- I dore say.
- 61. Q. Are you satisfied with the machinery at your command for giving advances ?—Yes.
- 52. Q Is there any difficulty in giving advances owing to the cultivators having to come in to head-quarters ?- That we could meet conselves in utilising the planters, and although this is not provided for in the rules, I believe maney was so advanced under the Agricultarists' Loans Act through the medium of selected planters in 1897; and I may add that in the same year in Cutiack (Orissa) I sent money out to the rayats in their villages by a Deputy
- 53. Q. How would you advance through the planters?—Make inquiries first as to who wanted them, and then entrust the money to the planters and also by getting the selected planters to make the necessary preliminary
- 54. Q. (The President.) -Mr. Tytler in his paper says he advanced Rs. 1,86,000 to build wells, and he was able to do this largely by his own personal influence, having devoted his whole time and energies to this particular work. Do you think it would be an advantage to have at any rate, for a time, a special officer to push it in that way?—Yes, if the need is distinct.
- 55. Q. Are you not satisfied that the need is distinct?—I shoold like to see first the rivers properly atilized. That would protect a very large portion of the district.
- 56 Q Mr. Tytler says it would be possible to have a well in every 10 or 15 acros of the district ?—In some parts.
- 57. Q. Is there no danger of exhauting the water in the and-soil?-Not, if we have water coming down from the
- 58. Q. (Mr. Rajaratna Mudaliar.)—Could not the proprietors pay the cost of keeping upon those channels and recover from the tenants P—It would require logislation.
- 50. Q. They can levy enhanced rents ?—It is only required for protection; not every year; it is not with a riew to increase produce. Nor could they enhance the ronts legally.
- 60. Q. You say the construction of the embankment has deprived a large area of the benefit of spill irrigation; what area was affected ?—The whole district.
- 61. Q. Has onlivation suffered in consequence ?-That is going back to ever a hundred years. Conditions must be clanged. It must have been an improvement generally, but undoubtedly individual portions have been injured.
- 62. Q. Do you think proprietore can be trusted to disbarso loans to tenants ?- Very fow. I doubt whother they would

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nndertake-te-do it. They would be airnid to deal with Government money, and I do not think it would be very safa to give it to them.

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63. Q. Is the whole of the embackment cess spent?—I helieva the last contract was an actual loss.

64. Q. (Mr. Muir-Mackenzie.)—Mr. Tytler got the smaller cultivators to combine to receive the advances. Is that practicable?—Mr. Tytler was an unusual person. He had been 26 years in the district and knew pretty well every cultivator personally in the north-western holf of the district.

### WITNESS No. 26 .- COLONEL J HODDLING, Planter of Chapra.

J. Hoddling. with this district?—I have been 81 years in Chupra.

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2. Q. Were you there in scarcity or 'fsmine?—Five times in my recollection.
3. Q. Fumino?—No. 'There will never be a famine in

- 3. Q. Fumino?—No. There will never be a famine in Chopra. The mesus of communication are so plentiful. But I have been there in five periods of scoreity when they did not know where to turn for a penny.
- 4. Q. What recommendations would you make to mend matters?—One neetbod is obvious; the working out of this cannl plac which Government started in 1832,—the canal Mr. Growse spoke of.
- 5. Q. Whot would he the hest course to adopt for the future working of that canal?—It is a very long story and there is a grent deal of bitterness and feeling about it. It was promised that if the planters guaranteed to pay a num to Government for outlay and maintenance on the canal, it would be opened. The sum was divided among eight planters and there was a clause in the agreement:—"No water, no payment." We were continually being disappointed about the water-ampply, and when we claimed romissions of our guarantee, we ware mot with oil sorts of objections. Thora was also a clause that we were to collect from all the rayuts who took water, and that in cases where we could not realise the money, the Collector of the District should take when we wanted to go in for the certificate procedure the Collector, I am certain owing to great press of business, was unable to carry it out. (The certificate acts as a decree of the Civil Court.) There is hardly a guaranter who has not large outstandings to this day, because the certificate procedure was never enforced. When the agreement expired Government then said—"We will now outer into a fresh agreement. Your guarantee in the past was not sufficient. You will pay a higher guarantee, and wa will cut out that 'no water, no pay' clause, and you shall pay this higher guarantee whether we give you water or not." The guaranters refused to accept these terms since then. The Caual Department has persistently refused to open the capals nules would pay down on the nuil the earn they fix on before any work is done.
- 6. Q. What is that snm ?—Rs. 21,800 was the last estimate. The canal protests 1,700 miles of country. In 1884 when the canals were not working properly they actually irrigated 21,000 acres.
- 7. Q. What would be a reasonable modus vicendi?— The planters are not in a position now to gnarantee anything. Indigo is in such a condition that it is no ass discussing any modus vicendi, because the planter bus practically ceased to exist.
- ecased to exist.

  8. Q. Ho exists us a zamindar?—He is hanging on, but I am ufraid his last hour is very close. He cannot get meney to work his factory, much less gnorantee anything to Government. You can only think now of proteeting the district from distress and the planters must be loft out of the account. If the scheme were taken over by the District Boord, it could be worked perfectly ut a small cost. Up to 1884 it cost R. 32,000 a year according to Mr. Fanikaer's account, hat that included three or four cogiucers, a lorge subordinate etofl, pension list and leave allowences. The netal working cost since 1892 works out at Rs. 6,200 a year.
- 9. Q. Would the cultivators necept the cost of making and mointaining as a cess?—Without much difficulty. About two pies in the rapes would cover it.
- 10. Q. How long have the canals remained closed?— Since 1892 when our guarantee expired. Thay carried it on under a modified guarantee for two years more.
- 11. Q. And you think that all that is wanted would be a trifling outlay on maintenance and the opening of the sluices?—It would he a use naless you put weirs at intervals of, say, 10 miles on all the causles. Perhaps Re. 2,000 a weir would do it. I am building a weir now myeelf, and it won't cost me more than that.
- 12. Q. That is cheaper than we generally do it. Do you think it would be a great been to the district to have these

canols opened ugain P—It would eave un enormous amount of dietress. They would be used whenever the rainfall did not come at the right time for rice, and for high land cultivation in years of drought, which is about once in six years in Chupra.

- 13. Q. In those dry years were the crops on the higher grounds all lost?—Absolate failures.
- 14. Q. If these canals were opened again; would they he enough for the district of Sarun with wairs in addition?—Yes. The Chupra District is divided into 'two classes of soil. In about \$\frac{1}{2}\$ crops are sown on notaral necistary. This is the area required to he protected. One quarter is another class in which all crops are sown practically on irrigotion. That already has its wells. I cannot speak from personol experience of this quartar of the district. The wells are fed by earface drainage. Pakka wells are not corried through the sub-soil. In the other three quarters any of these wells are perfectly necless for sowing erops on in the natural moisture tract. A pakka well will do at the outside five bighas; that is light after watering. The part for sowing on with wells is where there is no sandy sub-soil. It would ovet me Rs. 500 to out a well through that sand for good drinking water. I would be on a spring 30 or 40 fect deep.
- 15. Q. That would pull you through a drought?—No; it would not do more than five bighas a day. A bigha with me is \( \frac{2}{3} \) of an more roughly, i.e., \( \frac{2}{3} \) of an acre.
- 16. Q. (Mr. Muir-Mackenzie.)—Is these mach room for the extension of wells in Saran?—If they had to replace the notural moisture with artificial moistore, they would be no use at all. A well every hundred yards would be required when we do want water. It takes n lot of water to make up for the failure of the rains.
- 17. Q. (Sir Thomas Higham.)—How would you increase the embankment cess to include both?—It would require legislation. I do not think the zamindars would pay anything naless they were obliged to. They may be induced to agree, but I should not be hepeful of persuading them myself.
- 18. Q. Was the year in which 20,000 nores were irrigated a dry one?—Yes. There was water coming down and the rayats took it. The canals were not working very well. The district wanted water two or three time since and we got it in November and December, when the rice was dead and it was too into to sow the rabi. They would not open the canals before the rains hegun. I blame nohody, but it could have been done, if the work had been commenced in time.
- 19. Q. Taking 21,000 neres as a maximum done, will you increase that largely by parting weits on the rivers?—Yes, and by also making the most of small works from one channel to another. Octainly more than 21,000 acres could be irrigated. You might do 100,000 acres with cheap works. The part of the country approtected by the causles is that which is always irrigoted and therefore presumably adequately protected by wells.
- 20. Q. (The President.)—Should the District Board be anconraged to borrow from Government a sufficient sum to put these works in order and to control them afterwards, Government giving them power to levy a cess? It would he a perpetual burden open the district?—Yee, but now whenever we are going to have district, the District Board lies to set uside a large portion of its funds to meet it. We had relief works in 1892, in 1895, in 1874, the Bengel famine, and in 1866, the worst famine of the lot. The relief works were making reads, which we do not want; we have the hest reads in Bibor, and digging tanks in each you, which is ubsolutely necless.
- 21. Q. (Mr. Muir-Mackenzie.)—Have you perfect confidences in the efficiency of the District Board?—Yes, perfect.
- 22. Q. (Mr. Rejaratna Mudaliar.)—With what agency would they manage these works?—I would increase the District Engineer's staff. The rest might be left to the Collector.

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23. Q. Why chould the District Board management be more efficient?—Because it is directly interested in preventing scarcity. No doubt the Engineering Dopnriment would do their hest, but it is not a productive work; it would not, in their apinion, compare with schemes that pay Government, and they, would not have the direct interest in completing distress. boting distress. .

(Mr. Hare.)—In 1892 Darbhanga had to run into debt two or three lokhs. The Board has to hypothecate an

income for relief works.

21. Q. (Mr. Muir-Mackenzie.)—You have a strong District Board ?—Yes, I think so.

25. Q. A lot of plautors on it?—A lot of Europeans on the Board.

26. Q. (Mr. Rajaratna Mudaliar.)—Would the cultivators take water for 100,000 neros every year? Or would you only got applicatione one in six years?—Generally speaking, they would take it about once in six years.

28. Q. And would the District Board undertake the construction of all the improvements for a payment of two pies in the rupes?—I believe that would be quite suffi-

ejeut.

29. Q. Would it not be right to charge at least a rappe an acre?—If you ere going to levy a water-rate you want extensive machinery for collecting it, and then you must have a large cetablishment. Two pies in the rupee, I suggest, would be paid by the laudlord who would be allowed to make his own arrangements for collecting half from the myats, but it would be paid as part of his revenue.

80. Q. Could they not be induced to collect the water-rate by a commission of about five per cent. ?—Nat in our partiof the world. If you haid a two-pia cess, the rayats would say it was an Government order and must be carried out; but if you tell the rayat he has to pay something down, he would say "it is not necessary" end he will not do it. The two-pic cess would give Rs. 52,000 in the Chupra District. I would put it over the whole district. The cause of this want of water in the Chupra District was the making of the Gandak bund. It was thought right to charge the whole district for the heacits of the Gandak band, and I do not see why it is not just to charge the whole district for this cess. for thie cess.

31. Q. One wrong does not justify another ?-I am not prepared to eas that the first cess was an injustice. By opening the causes the spring level of the dietrict will be kept up. A minfall of 40 inches gives n rabi.orop; a rainfall of 20 inches will give nothing. If you have the water level kept up, you will get a good crop, possibly with even only 20 inches.

32. Q. One man gets a direct benefit and nuother an indirect one, but you would make both pay equally?—Yes, but to be absolutely equitable you would require very extensive machinery for collection, and the whole scheme would be put out of the region of practicel politics altogether. The people say—"But for the Gaudak hund we chould have had the water we require. Others have had their benefit from the land, we want our banefit now by the conging from the bund; we want our benefit now by the opening

# FOURTH DAY.

## Muzaffarpur, 28th October 1902.

# WITHES No. 27 .- Mn. A. OGILYY, Mnoager, Hatwa Raj.

1. Q. (The President.)—You are Manager of the Hatwa Estate?—I have taken over the management within the last six months.

2. Q. Have you other interests in Saran ?—I have managed properly there. I have had an acquaintance with the district for 25 years.

- 3. Q. Is there any strong feeling in Saran as regards the improvement of irrigation or necessity for having it?—There was a very strong feeling in the Hotwa Raj last yeer as regards the importance of having the four existing caunlized rivers opened practically at a moment's notice when they are required.
- 4. Q. Those being the four that have been mentioned and that have been closed for some time?—Yes, and in addition to that I think the position of the Hatwa Raj is one in which irrigation should be possible for even a larger area than these four rivers can command; there are two other rivers that could be put in the same position; they would not be remunerative, but they would be useful as protection against families. This, I believe, could be done at very small expense, and it is a question whother it would not be worth while to do it.
- 5. Q. Would the water be used in ordinary years P-Not of the extension; a certain amount would probably be used in ordinary years; although the minfull uny be unplo, there is great irregularity and irrigation may be required at a moment's notice to produce the best results.
- 6. Q. Elsewhere we have found sometimes that a superior sort of rice may be grown if the people can rely upon the water with certainty. In there any likelihood of that here?—I don't know in Saran. It probably is due in other districts to irrigation altering the character of the land brought under rice; that is, rice being introduced into a new sort of soil. I think it is possible that it would have some slight effect. elight effect.
- 7. Q. To put these canale in Surau into proper working order, I suppose a considerable outlay would be required at first?—I think a fairly large outlay is required for putting in sluices, so that the water is brought to a useful level.

- 8. Q. Would it be necessary to throw weirs or bars across at the heads of distributaries?—Yes, I don't think that would cost very much; they would be small
- 9. Q. Would the district be prepared to pay for their works?—I can only speak for the Hatwa Raj; it represents about one-fifth of the district. I think the Hatwa Raj would be well advised to agree to considerable expenditure ns protection against famine.
- 10. Q. I have no authority for saying what view the Government would take; assuming that Government were willing to grant a loan at a cortain percentage, do you think the loan would be taken up in the district by the District Board or any other machinery that there might be? Would they be inclined to assume responsibility for a debt of that sort?—I think so,.
- 11. Q. Would the District Board like to carry out the works, or prefer that the Public Works Department should earry them out and then make them over?—I think the District Board would be well advised to have it done by the Government, and then take them over.
- 12. Q Should recovery be by cess or water-rate P-I think it must be by cess, because the work is protective and not rounuerative.
- 13. Q. Do you think that would be accepted with tolerable equanimity? If they knew that the water was certain as in the case of the Sone Canals, would they be tolerably well pleased to pay a cess?—I think so. It would not be looked upon acceptably beachief in Saran which is not so. dependent upon it.
- 14. Q. Of course, if it were laid upon the whole of the district or in n sub-division, a great many would have to pny who might not have the water?—If the extensions which I have proposed were carried out, they would practically command the whole of the district.
- 15. Q. Now these extensions which you propose, have they heen technically examined?—No, I have acted for assistance with the view to having them examined. The thing was started shortly after I came to Hatwa.

27 Oct. 02.

Mr. A. Ogilvy.

28 Oct. 02.

Mr. A. Oyilvy. 28 Oct. 02.

- 18. Q. It means placing claices along the right back of the Gandok?—It would require head works in the Bacci nullab. I would utilize the Jarai nullah which comes out of the same seta as the canalized rivers. This would require a bund; the same as that required in the seta below the sluice of the Dahar river.
- 17. Q. The irrigation is all lift, I understand P—Yes, at present, the great desideratum is to roise the level of the water in order to utilize it by flow if possible.
- 18. Q. Ie there any apprehension of fever from insanitary conditions?—On the contrary: as far as I know at present, the Jarai is considered feverish owing to want of flow, but the conditions will be improved.
- 19. Would the district be prepared for the barden of a loan?—I conclude it must be prepared to nea-pt the burden of nanual mointenance; it would require a certain amount of inspecting and patrolling establishment; it would be a very light impositim.
- 20 Q. Would they prefer that the whole thing should be taken over and made an Imperial work to be worked by the Public Works Department?—Not if the control is removed from the locality.
- 21. Q. They prefer it should rest with the Collector and the District Board ?-With the Collector practically.
- 22. Q. The District Board has the confidence apparently of the people here ?-Yes.
- 23. Q (Sir Thomas Higham.)—You think this should he worked by the Collector with the assistance of the District Engineer and the District Board is to be brought in for the seke of financing it ?-Yes.
- 24 Q. I think we were told yesterday by a witness that a bund was made for the benefit of the Hatwn Raj to which the rest of the district would have to contribute?—The work protects the whole district from immediation (Explained on map.)
- 25. Q. What is your ideo of the way in which recovery should be aiodo for the eart?—I think a coss is best. I don't think a water-rate is possible under the conditions under which it would be worked.
- 26 Q. (Mr. Muir-Mackenzie) The coss would be a percentage on the revenue of the zamiudars?-Yes.
- 27. Q. Do you contemplate the District Board mounging the maintenance of the canalization system?—Yes.
- 28. Q. Would they control the maintenance establishmont, etc.?-Yes.
  - 29. Q. And pay the men?-Yes, certainly.
- 30. Q. The eess would only be the equivalent of the interest on the initial works?—The cess should cover maintenance also.
- 31. Q. Is there any room for the extension of well irrigation in Saran?—I think there is. I can only speak for the Hatwa ttaj; the Raj has constructed wells practically as fast (far?) as they can be made.
- 32. Q. What is the system by advonces to cultivators? -We do it at our own expense.
- 33. Q. Does the Raj get an enhanced rent f-I don't think it would enhance its rent for a thing of thin cort. We would register them os improvements as a matter of
- 34. Q. Has it registored wells as improvements up to the present ?—Yes.
- 35. Q. What is grown under these wells?—They were originally started for poppy; there is also sugarcane, wheat, and, of course, garden crops.
  - 36. Is there any tobacco?-No.
- 37. Q. Generally valueble crops that require high cultivation? - Of course a well is more necessary when high eultiration is possible. They like to have wells also in sandy tracts that cannot be irrigated without them, though high eultivation may be out of the question often owing to the distance from a village.
- 38. Q. Whot men does o well irrigate in each tracts? Four to five bighas is the maximum in sandy coil, a bigha veing equal to fths of an acre.
  - 39. How much does a well cost?-About Rs. 70 to 80.

- 40. Q. Pakka P-Yes, bricke set in mud.
- 41. Q. How big ?-Seven feet in diameter, with two
- 42 Q. (Mr. Allen.)—The price you mention would not include cost of labour?—Well, labour is very cheap.
  43. Q. (Mr. Muir-Mackenzie.)—The cultivator does it himsell?—Yes.
- 44. Q. You say Saran is not so dependent as other tracts on canals; in that a well cotablished fact? That is my own experience, which is confined to the Eastern Sone Coool; the area under my management, that was watered by the conal, was entirely dependent on irrigation.
- 45. Q. And would not have been previous to the intro-duction of the canal?—It always was irrigated by come means which the Sone Cenal was in substitution for.
- 46. Q. Saran was not previously irrigated by such means?—Soran genorally is not irrigated.
- 47. Q. (Mr. Rajaratna Mudaliar.)—How many wells hos the Raj constructed in the past ten years?—I cannot tell you; my experience of the Raj only dates from six menths ngo.
- 48. Q. (Mr. Muir-Mackenzie.) How many have you made in your time?-I have sauctioned 50 to 60, as many os I can push through.
- 49. Q. Do you hope to get through a hundred a year?-
- 50. Q. Would you bope to duable the number of wells within n reasonable period?—I have not yet been able to acquaint myself thoroughly with the conditions of the Raj. I cannot say. I can imogine it to be possible.
- 51. Q. Within how long a period-20 years?-I hope in
- 62. Q If a similar energetic policy were pursued, coald that be done in other parts in Saran?—The conditions are not the came. The Hatwa Raj is doing them for nothing. Proprietore elsewhere are not in a position to pay for wells
- 53. Q. The Raj are making the welle purely from henca-
- 54. If it was a matter of paying, could wello be doubled la your Raj merely to pay?—It would pay the rayat, not the proprietor.
- 55. Q. (Mr. Rajaratna Mudaliar.)—The Raj does not expect to make any profit out of these well-?—No.
- 56. Q. Would there and be some indirect gain in the chape of certainty of rent?—Yee, to a certain extent undoubledly.
- 57. Q. What is the rate of rent on such lands ?-Tho average rate of rent is about Rs. 3-8 per bigha.
- 58. Q. Why do you prefer the District Board to the professional departments P.—Because it is on the spot; the District Board represente oil the intereste of the district.

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- 59. Q. The gentlemen of the District Board can even now represent their wants to the Court Deportment?—Yes, but it takes six months.
- 60. Q. If there is a special Executive Engineer in charge of the works? Certainly, at present it takes too long.
- 61. Q. If that delay weie avoided, would you still prefer the monagement of the District Board?—Yes, it would be freer from the red tape that nos been necessarily intro-
- 62. Q. Do you think the management would be less costly. I think it would be better to begin afresh.
- 63. Q. On whot grounds would you levy a cess on the whole district and not simply on the area commanded?—I think the whole area is commanded.
- 64. Q. But some portions will get greator beaufit than others; won't they ?—Yes, to some extent, it is so very lard to arrange for the collection of n woter-rate. It would be very difficult to discriminate between area irrigated and that indirectly benefited. It might bo done. .
- 65. Q. Would it not be just to do it ?-It would be as well if it were possible.

Mr. J. D.Macgregor.

WITNESS No. 28 .- Mr. J. D. MacGeegon, Arrowali Concera, Chupra.

1. Q. (The President.)—Are you a resident of Saran?
—Yes, I have been bere for 30 years. 28 Oct. 02.

2. Q. What part of the country are you in !- The south-

Macgregor.

28 Oct. 02.

- 3. Q. You have just now heard what Mr. Ogilvy said; do you agree generally with him?—Yes, except in seme
- 4. Q. Where do you differ?—With regard to the District Baard and ortaking the whole thing, I think it would be better that they should be made from Imperial.
- 5. Q. Do you mean on first construction?—Yes, it might he too large a business for the District Boord.
- . 6. Q. Do you agree with him in thinking that, after the works were put in proper order, that the Board might keep them going?—Yes, certainly; having been put in order rethey should be made ever to the Board.
  - 7. Q. On what other points do you differ from Mr. Ogilvy?—I happen to be best ocquainted with the southeast part of the district where conditions, both as to soil and notucel conformation of the country, are different from the north-west or Hatwa Raj side.
- 8. Q. What other variations would you desire to meet the conditions of the south-east corner—extension of the Saran Cauals? - We have sufficient wells in that part; these wells are of very little use in dry years unless helped by sub-soil diamage which is benefited by the Saran Canals. I find from my own local experience that when these canals are running, water in the wells is 16 to 18 feet from the

- 9. Q. What is the depth of the spring level when there Mr. J. D. is no canol?-20 to 25 feet. Macage ago.
- 10. Q. You sold in dry seasons you could not trust to wells; do they run dry?—Yes, completely dry.
- 11. Q. Have experiments been made to dig them deep er?-Yes, but they silt in promptly; the sub-soil being
- 12. Q. Are you talking of pakka or kachcha welle?—Both; the sub-soil is pare sand.
- 18. Q You never irrigated rice from the wells?—No, it is impossible.
- 14. Q. Is this south-east corner generally rice country? -No, it produces mostly the richer crops—petotocs and
- 15. Q Do these foer canels supply water for the rabi? Yes, and for whatever rice we have
- 16. Q. When the canals were in proper working order, did they run all the year round?—Yes, nearly.
- 17. Q Are there any other points you would like to oring before nef-No, I agree generally with what the other witnesses have said.
- 18 Q. Whet do you feel about the cess? Woold there be a strong feeling against it?—There is a strong sentiment in favour of it; very few would object to the cess.

#### WITNESS No. 29 .- Min. T. R. FILGATE, lately of Burhowli Concorn.

- 1. Q. (The President.)-Have you had long experionee of Saran?—I have been connected with the factory for the lust 13 years and I have had personal experience in North Bihar for 26 years.
- rioneo of Saran f—I havo been connected with the factory for the lust 13 years and I have had personal experience in North Bihar for 26 years.

  2. Q. You have just heard the evidence of Mr. Mucgregor and Mr. Ogity; do you agree with them?—Yes, generally. With regard to the Saran Caanls, you have a considerable amount of water that is new running to waste, with a small expenditure on the present system the water could be utilized; you could fill the chaurs (which are natural reservoirs) and raiso the water level of the district; this is really required not as a remunerative work, for that it could nover be, but as a protective work in times of searcity. In the first instance, relief charges have to be mot by the District Beard. In 1806-97 10 lakhs were spont in Saran which the District Beard could not meet. At a conference hold in Sonephr on the 20th of Novomber 1896 Sir Alaxander Mackenzie, presiding as Lieutenent-Governor, said it would be perfectly impossible for the District Beard to meet that expenditure. Mr. Finucane estimated that, by the 31st of March 1897, 3 lakhs would have to be spont in Saran, and so the Lieutenant-Governor said this would have to come out of Imperial funds. In Saran ence in 4 to 5 years there is scarcity owing to failure of rainfall, and the change proposed would be one or one and-a-half lakhs to be spent in relief. There was not much speat by the District Board in 1896-97; they spont all their aveilable funds on reads and tanks. The general opinion in Saran is that mency spent on reads and tanks is unnecessary. Tanks are made as a famine work; these innecliately after the famine are left alone and silt up, so that when they are wanted they are-dry. The roods are in good order and there are no more new reads on which money could he spent. It was placed on record at the conference that money could be usefully spent in making distributaries of the canals, previded that arrangements are made for keeping water in the existing channels.

  3. Q. Would the District Board like the work to be
  - 3. Q. Would the District Board like the work to be carried out at once, or wait till a drought occurred?—If it could be arranged that the District Board should apply to Government for a loan to make certain improvements in the head-works and certain weirs in the streams, not a very large sum, the money could be availed of at the present time. A cess would pay not only for the interest on that money but a cess, on the whole district, on the besis of the ombankment cess, would also provide for a sinking fund for what is to be raised. This would probably be Rs. 50,000. The District Board are perfectly well able to carry out maintenance, because the District Engineer in this district is supervised by the Superintending Engineer of the Public Works Department; the District Board under expert supervision could certainly carry out any work that was necessary. 3. Q. Would the District Board like the work to be work that was necessary.
  - 4. Q. Would you like the District Board to carry out the preliminary work of putting these eannly in good order?—Certainly.
  - 5. O. Ruther than the Public Works machinery?-Certainly, I think under supervision.

- 6. Q. You heard what Mr. Macgregor said that it might be beyond the resources of the District Board?

  —I don't think so.
- 7. Q. Do you think that the district would accept the burden of this additional cess in consideration of the advantages to be gained by protection?—I certainly think they would, they puy nu embankment cess which protects them one year in four; the same thing would upply here with regard to water.

8. Q. (Sir Thomas Higham.)—Did you say the supply often failed; and that once in every four or five years you require 1 or 1; laklas to be spent on relief?—Yes, perhaps more.

- 9. Q. Have you been spending 14 lakhs every four or five years in the past 20 years?—I have been connected with this part only during the past 10 years. In 1892-97, when the severity was as serve as we are likely to have it, 10 to 11 lakhs were spent. In 1892-93 also a large sum was spent. 93 also a largo sum was spent.
- 10. Q. (The President.)—In 1896-97 Imperial funds were given?—Yes.
- 11. Q. (Mr. Muir-Mackenzic.)—You had to contribute one lakh?—No, nothing: one lakh was put apart, but was not spent by the District Board.
- 12. C. (Sir Thomas Higham.)—Have you may idea what lean would be required to put these works into order?—I could not possibly say definitely at the present moment. I should say something like 3 lakhs of rupees borrowed by the District Board would make certain distributaries and do what was necessary at the light.
- 13. Q. Do you think the amount required to pay interest on that lean and to cover all the working expenses should be recovered in the form of a cess?—
- 14. Q. Would that not be a very heavy charge?-No.
- 15. Q. Last year in Bengal the rates charged for water were not enough to cover the rates of interest and working expenses. Would not the cess be very heavy?-Nu.
- 16. Q. (The President.)—Colonel Hoddling said yesterday that a cess of 2 pies in the rupec would produce Rs. 50,000.
- 17. Q. (Sir Thomas Higham.)—I suppose this cess could only be imposed by the majority of the land-owners?—No, I think it could be imposed in the same way as the embankment cess; or, perhaps, it would come under the Drainage Act; I don't knew for certain.
- 18. O. (The President.)—I presume it would want legislation?—Yes, I presume it would.
- 10. Q. (Mr. Muir-Mackensic.)—Is there any room for the extension of well irrigation?—Not in my end of the district; that is in Baraoli factory on the Gangri.
- 20. Q. The soil there is not snitable?—It is suitable, but you can do so little with a well in the case of failure of rain; when you get in your cold weather sewings you can assist, but if there is no mois-

Filgate.

Mr. T. R. ture, nothing can be done; it would be useful for sub-Filgate. sequent watering.

- 28 Oct. 02. if you tood an improved cannot system?—I have no doubt wells would increase, because the water level would be raised. At present wells no net very deep, and when the rains fail and there is ne water in the rivers, most of the wells are dry.
  - rivers, most of the wells are dry.

    22. Q. When wells are made, are they made by zamindars or raynts?—Mostly by the raynts and net very lorgely. I had experience of very few in 1890-97. I was authorized by the Collector to give advances for wells. In 1896-97 there was only one case in which they applied for money for a well; four mon jointly lieble applied; this was a fairly big well; it was capable of preserving 5 to 6 bighas of crops; but there was not sufficient water in the well to raise a crop in the first instance. in the first instance.
  - 23. Q. Wore any of Mr. Tytler's wells in your part?
    -A few; they were principally to grow opium.
  - —A few; they were principally to grow opium.

    24. Q. They were made by very carefully selected men?—I should say so. With the permission of the President the witness made the following statement:—

    "As regards Saran, I don't think that sufficent use is made there of the existing sluices in the embankment; there are sluices letting in water from the Gogra and Gandak; these were provided by the Public Works Department and naturally they have done their part of the business. It was for the people of the district to make distributaries and carry the water to the chaurs; this has not been done. In some places I have personal knowledge of a good deal of rice being savedy in m; own part the big chaurs were

perfectly dry. In Chapra the Collector let in water and raised a 14 or 15-anna crep; the same thing happened on the Gandak embankment; the Collector went there and opened a sluice ned where water was got into the cheur the dén was very good. One difficulty is that clong these rivers a high bank intervenes between the river and rice lund; along the high bank where the lond is good at the time when water is required for the rice there is a maize crop in the ground; very neturally the mon possessing a maize crop objects to any weter going over his loud to save the rice erop inside. If distributaries were made along the bank, you could get a greet deel of water into the cheur raiside." Numerous cheurs could be filled in this way from rivers.

25. Q. Are there a greet number of these sluices? a muizo .

- 25. Q. Are there a great number of these sluices? I nm not sure; the Superintending Engineer could
- 26. Q. What is the size?—Some of them are 6 to 10 feet wide.
- 27. Q. Who are these sluices under?-The Public Works Department.
- [Mr. Grouse in conversation with the President gave some details of these sluices and explained that the difficulty was to get them opened at the right time owing to the absence of the officer.]
- 23. Q. (Mr. Muir-Mackenzic.)—You said that the tanks which were inide in the famine were useless, because they were not cleaned out but left to sit op; could they have been made any use of if they were properly looked after?—Very little; perhops only to water cattle.

#### WITNESS No. 30 .- MR. G. P. SIMEINS, District Engioeer, Saran.

Mr. G. P. 1. Q. (The President.)—How long have yoo been Dis-dimkins- trict Engineer here?—From the 3rd Jano 1897.

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- 2 Q. Can you give no any information about the sluces?—They are primarily for dminsge of chaurs after the river has fallen.
  - 3. Q. How are they worked?-With the old screw.
- 4. Q. They merely begin to act when the floods are going down?-Yes. I have never seen them used for drainage or any other purpose except once.
- 5. Q. Have you anything you would like to call our attention to with regard to these canals î—I think, as a protective measure, they are most valuable; we have a very bad rainfall in the district and softer very much from scarcity. They could be utilized to give moisture in years of drought.
- 6. Q. There must be a large amount of silt?—That will tend to make them ultimately high level canals and enable us to work better in future
- 7. Q. Have you any idea, roughly, what it would cost to put this system of causts into proper working order. Mr. Filgate said 3 lakhs?—Yes, 3 to 4 lakbs would give a fair scheme.
- 8. Q. Then there would be maintenance charges f-That would be Rs. 20,000 to Rs. 80,000.

- 9. Q. Would there be quite within the power of the District Board to manage?—I think it would be better if original works were carried out by Public Works Department; they have better facilities and training.
- 10. Q. And the maintenance should be left to the District Board ?- Yes ; we could do the ministenance.
- 11. Q. From your knowledge of the district do you think the people would resent a cess to cover these charges?—They would like it, I have spoken to them about it and they said they don't mind a cess like the road cess; but they will not pay o water-rate.
- 13 Q (Sir Thomas Migham.) What about the Jharai? If the Jharai were brought into the scheme, it would be a neefol thing; it would water a coosiderable tract of country, both north and south.
- 13. Q. There is a trough f.—There is a high tract ron-lng between Dahai and Jhami. You would have to raise the level of the Jhami and so get water there.
- 11. Q. What is the total area that would be commanded F-Prabably 120,000 to 150,000 acres in the whole district (conversation over map). If the Jharni were included, it could irrigate 40,000 to 50,000 acres more than

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15. Q. How do you arrive at that ?-From what I have seen of the district and the country that could be irrigated,

WITNESS No. 31 .- Mr. H. E. Annorr, Indigo Planter, Muzaffarpur, Tirhoot.

Mr. II. E. Abbo!t.

- 1. Q. (The President.) -- Ifow long bave you been resident of this part of the world ?-- 40 years.
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- 2. Q. As what ?-Indigo planter and manager of zamindaris.
- 3. Q. Have yoo ever seeo famine in the district?—I have seen five famioes : it was very bad in 1861.
- 4. Q. Did you see the 1873-74 famine ?—Yes, that was a made famine.
- 5. Q. Is the district in a better situation to face famine new than it was before?—In one way, railways have opened up the country and asserted the bringing in of grain. In Sir Richard Temple's time transporting grain to the north was an impossibility, as the bullocks that carried it up ate it all. Now you can lay the grain at the doors of the needle. doors of the people.
- 6. Q. What measures would you advise to effect protection against famine in Marassarpur?—Controlling the rivers to start with on the American system; banking up the Bhagmatti which is a dangerous river. I think the

- stopping of innodation would be far more desirable for the country than irrigation.
- 7. Q. That of course is rather outside our field. Our Commission have really to enquire how far Irrigation could help?—I think it can help o great deal. Let channels be opened up; there is no doubt that a system of reservoirs in the way of tanks would be of enormous value. The great difficulty that we have to contend with is a poor population of tennots and a still more impoverished let of continuous. windars. There is not a single banker with big money behind him.
- S. Q. Is there much irrigation in Muzaffarpur ?- No.
- ?. Q. Are there pines?—They bove silted up, because the munindars have not forced a periodical cleaning out by their rayats.
- 10. Q. Assuming that artificial irrigation were introduced into the district, would it be availed of every year?—Land in this part of the world is exceptionally carious. When once you irrigate a field, that field gets obstinate,

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and it will not grow a cold-weather crop again without irrigation.

11. Q. Is there a wish for irrigation in the district?— It is difficult to say. The rayots would like everything if they could get it for abthing.

12. Io there much well irrigation?—To a certain oxient by men who grow poppy and chena, and now that this new scheme is being put forward under the management of Mr. Rowland linden, I think wa sholl see it used for sugarcane which seems likely to be the fotors stople or of Tirhoot.

13. Q. It will require well irrigation; will it not?—Woll irrigation will drow "Roc" where it exists to the surface and it may benefit the standing erop, but that is only where the aniphate of coda is not in too excessive quantities. Mr. Tytler found that where poppy was nown, and there was sulphate of soda in the soil, well trigation drow it out.

14. Do people avail themselves of the advantage of making wells?—The expense is too greet for one coltivator. As a rule, one will not take the lean, and it is difficult to get three or four to combine. Uccosionally a well is dug on an ampleious occasion—o marriage or something of that

15. Q. (Sir Thomas Higham.)—You will require mere extensive irrigation ?—Wheo they begin to cultivate from it irrigation must be an enormous odvantage. It means sately instead of a toss up. Cano can be grown without irrigation in strong soils.

16. Q. Any extension of irrigotion in the way of small canals challd be done by means of a loou to the District Beard?—Yes.

17. Q. Recovered in the form of a cess?—Yes. That is Mr. H. E. Abbott.

18. Q. Would the cess be accopted generally throughout the district?—Yes. Sirkar ka hakum is still accepted humbly in these parts, I am glod to soy.

19. Q (Mr. Muir-Mackenzie.)—Mr. Tytler in the poper he farmished unrrated how he advaced Rs. 1,46,000 for wells to cultivators whom he induced to combine. If any porson took op the work as his sole duty, coold he do the same?—Yer, and a Goronmont official would have ten times the weight of a non-official.

20. Q. There ore plenty of lands suitable for such an extension in this district?—Yoo; it is different from Saran, which is sandy. This soil holds it moisture foirly well, and with 50 or 60 inches of min the crops are foirly sate.

21. Q. Would such an extension be possible in this district?—I doubt it. Io Tirhoet any extension would not be much.

23. Q. (Mr. Rajarvina Mudeliar.)—Could any facilitles be afforded by advancing leans at a cheaper rate of interest?—The cheaper the rate the more rayats are likely to take adventage of them.

23. Q Is an extension of the term from 20 to 30 years desirable?—Certaluly; more would be likely to apply.

24. Q. Ought oot some difference to be made in the cess between one men getting a direct benefit and aunther getting only an indirect advantage?—That might be left to the officers of the district. Certainly, it is just.

WITKES No. 32 .- MR. G. W. DIENET, District Engineer of Muzaffarpur.

Note on the proposed Ragmutty Canol.

The scheme as proposed by Mr. Mills was for a channel some 10 miles in length, strongly protected at its head work and at the inleta and ootfalls of the masies or water-courses crossed to convey water in scasons of drought from the Bagmatty rives, where there is an ample supply, and lead at anot the Paronodhar and Lakhandyo rivers which would act as distributing channels and from which arrivation is habitually carried out, either by flooding the adjacent channels carried out chants or natural depressime in the country or by lifting the water for the irrigation of land close to. There is a regular system of pains an irrigation channels constructed by the malits from the river Irakhandye, in some cases ranning for miles lahad. Work was commoneed no the excavation of this olumnist during the famine of 1897, but not completed. It was proposed merely as a scheme to provide for the trigution of rabi and dry weather crops in times of drought and would be most useful for this purpose. The cost is estimated by Mr. Baller at its, 2,05,762, say, its, 3,00,00 exclusive of establishment and other charges. The length of the Purandhar and Lakhandyo rivers, measored along their coorses, from which water could be attilized for irrigation purposes, io some 90 and 60 miles respectively, and assoming that a tract of country 2 miles in width on each side would be more or less benefited, the area works out to 600 square miles or 3,64,000 acres. The Collector of the District (Mr. Chopman) in his report on the subject dated extinoted thio os 200 oquare miles, which is practically identical, excluding the Purandhar. (The area served by the Lakhandye I calcu-

(Mr. Chopman) in his report on the subject dated estimated this os 300 equato miles, which is practically identical, excluding the Purandhar. (The area served by the Lakhandye I calculate as 60×4= 360 squore miles.) Mr. Butler in his report assumes that the High Level Canal with distributative would command 210 square miles of country and bases his financial calculations on irrignting 103,000 norea. Mr. Mackenzie, the Minnager of Hojkhund Factory, situated on the Lakhandye and who regularly irrigates from it, estimates the cost of bunding the river and running water down through existing pains at half as anna a bigha (= 8 acre). Funds are generally made at introvals of some 10 miles apart, but could with a good water-supply be done at less than half of this. Taking the existing of rennatances and the area served by each bond, as stated by Mr. Muckowzie at 4,000 bighos, the Lakhandyo river may be assumed under existing of reunstances to irrigate 90 ÷ 10 × 4,000 = 30,000 bighos or 29,054 ocres, or at 5 miles intervals 53,108 acres. This two rivers combined, if a sufficient water-apply be provided, would distribute sufficient for 99 + 60 = 160, 160 ÷ 6 = 80 bands = 30 × 4,000 = 120,000 bighos = 08,849 acres. This is, I believe, an underestionte, but is based on

Mr. Mackenzie'o experience. The interest on capitol cost at 4 per cent, would amount to Rs. 12,000 per annose and it 5 per cent, would amount to Rs. 12,000 per annose and it 5 per cent, would amount to Rs. 12,000 per annose and it 5 per cent content of the tract served (viz., 384,000 acree) were assessed of 4 minus per acre, the incume would amount to Rs. 12,500. In order to regulate the rivers and the water-aapply they would have to be brought under no Act somewhat similar to the Bengal Sanitary Drumage Aot, which provides for an assessment on the arm benefited. Mr. Toogond lu paragraph 7 of his report forwarding the estimate stotes that "for rabi and but weather irrigation the cannot an be fed and water relied on." This is all that was channed in those demc. In year dry sensons the water in the Parandhar and Lakhandye rivers is intercepted by bunds high up their nourses, froquently outside British territory, whereas there is a constant nupply in the Lagrantty which runs to waste. If a small portion of this were run into the chairs, it would not only allow of the cultivation of moch rabi and hot seather crops as well as the early sowing of rice for seedlings, but would also appreciably roise the woter level of the surrounding country.

of the surrounding country.

2. In the foregoing paragraph the arguments in forour of the scheme as proposed by Mr. Mills are briefly detailed. In 1808, the year following the famine, Mr. Butler was deputed to investigate the subject and to submit detoiled estimates. Its characteristics were altered from that of the provision of a water-supply to augment existing and established local irrigation to that of a high level consistent which the water would be supplied by gravitation, along with the necessary distributaries and adjuncts, which he estimated to cost some Rs. 4,00,000 more (exclusive of establishment charges). This provides for their rigation of the klarif crop in October to the event of a failure of the rains. From the deduction drawn by Mr. Toogood from rainfall statistics of the Sitomahli Sub-division water would be required for I year in 4, or 2 years in 5 for a full crop outturn. It is further stated, and this is an uncontrovertible fact that, without a worr corose the Ragmotty river, the result (in October) would be problematical. Moreover, the site is one eminently unfitting for the construction of o work of this description.

2. From the evidence before me and my local knowledge

struction of a work of this description.

3. From the evidence before me and my local knowledge I nm of opinion that a High Level Canal such as last proposed is ancalled for by the streamstances of the case and nearly impracticable. Mr. Mill's original seleme alone remains to be pusidered. It has much to recommend it as it provides for the utilization of water whileh runs to waste during sensons of drought, and which is worth gold, but it is one that, owing to the easterly trend

Mr. G. M. Disney.

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Mr. G. W. of the Bagmatty river, and the action of the recent flood
Disney.

on the Stamarhi Dheag branch of the Tirhoot Stote railway will have to be very carefully worked out and ample
provision mede for the spill of flood water, when such is
necessary, with this in view I had the excavated sections
made into clongated embanked tanks, while the work was in progress.

4. The figures given by me as regards probable belance hatween Income and Expenditure ore merely very approximate. These would have to he carefully verified. The estimated cost of se far completing the work as to make it of use would probably he—

•	_					Ka.
Head sluice						19,381
Tail weir	•		•		•	17,838
Bridges .	•	•	•	•	•	3,936 83,673
Earthwork	•	B.	165	•	•	52.115
Land, 297.8	Bores	at As	- 11n	•	•	
						1,76,943

(Interest on estimated cost, say, Rs. 1,77,000 at 4 per cent.=Rs. 7,080 psr annum.)

Deduct value of work dons during famine-

		Rs.	Rs.
Enrthwork . Land acquired .	:	30,395 22,250	52,645
		88.7	1,24,298 1,25,000

(Interest on balance of estimated cost, Rs. 1,25,000 at 4 per ceat. = Rs. 5,000 per annum.)

5. The main advantage of the scheme is, in my opinion, that it odmits of the filling of many chaurs in the country, thus keeping up the water level during seasons of drought. It will therefore benefit a larger area than that actually affected by surfoce irrigation.

Irrigation and the filling of chaurs.

The great want of North Bihar is a means of filling up the chaurs or notural reservoirs of the country during ass-sons of drought. There is maple water available, but this, as a rule, rune to waste in the rivers owing to there being no organized means of its ntilization.

In order to arrive at a conception of existing circumstances it most be recognised that, in order to save lands from being flooded while the rivers were high, marginal embankments have from time to time heen constructed, the consequence being that the river-beds have been raised by the deposit of silt, and have become to some extent high level cansis with no fally developed means of conveying the water from them. There are sluices in the Gandak and Turkoy smbankments in this district, but there is much scope for the excavation of locally called pains, or distributing channels from them. In the private hunds along the Bur Gandak and Fagmatty rivers I have not seen only attempts made at this. Owing to the shove facts many of the chaure are only filled up either by a heavy local rainfall, or when the hunds hurst doring flood time. Moreover, mony chaure could be filled by jediciously made channels from the rivers, the inlets to these heing protested by slaices. This, in addition to the direct gain to land irrigated, would be of great service in raising the water level of the vicinity.

What I take it as required in order to provide for the

What I take it as required in order to provide for the woter, which is now wasted being made avoilable in seasons of drought, is some less elaborate system of irrigation than of arought, is some test emacunic system of ringation than thost in a high level and expensive canal which is, I am of opinion, not necessary in districts similar to this with an average anamal rainfall of over 45 inches; merely inexpensive channels leading the water direct to the chaurs would suffice, the cost of making and maintaining these being met by a contribution or cess from the lands benefited. This might prabably he arranged for by enlarging the scope of the Bengal Sanitary Dramage Act No. VIII of 1895 which makes provision for the conservancy of rivers, if not provided for in any other Act.

- 1. Q. (The President.)-Have you been long here?-
- 2. Q. Have you had anything to do with the preparation of these schemes for the north part of the district?—Indirectly from time to time. The Boguntty Canal is the principal ons.
- 3. Q. You propose to improve the irrigation by bringing the sapply naw existing fram a more certain source?
- 4. Q. Have you been here through n famine?—Thres—1833, 1892 and 1897. They were, rather, scarcities. It was never intense famine. In 1888 the expenditure was never Rs. 2,39,000, in 1892 Rs. 93,000 and in 1896-97 Rs. 15,21,000 in this district almos. Taking the 18 years the negrous is more lake a year. the average is aver a lakh e year.
- 5. Q. Whot measure would you suggest for protection it against future famines?—The utilization of the existing water, as far as possible, is the naly thing, and the upening out and making of pains or irrigation chounels and sinces protecting these.
- 6. Q Are there many pains as it is P—Not many in this district. Must rivers have been handed along the margin from time to time, thus preventing the water from getting into the chaurs. Those are now dry in the dry getting into the chaurs. Those are a weather and the water level goes down.
- 7. Q. Were these chaurs formerly rice fields ?-Yes, and are to a certain extent still.
- 8. Q. Does not the district want water fire years oat af six?—Four out of five, probably.
- 9. Q. If there were n complete system of irrigation here, would it be availed af every year?—I do not think so.
- 10. Q. I suppose irrigation has only occupied a small portion of your time?—Yes.
- 11. Q. (Sir Thomas Higham.)—The Bagmntty scheme is no small value for irrigating the kharif crop!—Yes. I recommend that the cut made in the fumnce he completed.
- 12. Q. Your idea is that this should be a district work and the amount recovered by a cess?—Yes.

- 13. Q. If there is only o small supply of water, the first 10. Q. It ture is only 0 small supply of water, the first comers would get it, I suppose?—There would have to be series of by-passes. The river would have to be divided into sections by bunds and the water passed down to each in turn. The river might be banded in the hot weather. It is 500 feet between the hanks.
- 14. Q. Any other scheme for this district?-The other sobenes are for catting pains in the existing embankment to feed the chaurs. There are numeroes embankments in the river which shut out the water from the chaurs.
- 16. Q. Are these pains private nnes?-A few private
- 16. Q. Where do they get the water from ?-By buading the river.
- 17. Q. The cost would be great?—The muin Bagmutty costly.
- 18. Q. There is flooding from the Bogmatty; is there not?
  -Yes; this year it came down through Durbhanga and itamarhi. It cannot be stopped, because it comes from Nepalese territory.
- 19. Q. It is the cause of much damage to crops ?- A good deal of temporary damage, but this is more than recompanied for by the silt that is brought down by the Bagmuty and which improves the land.
- 20. Q. That protection from floods is more important than providing for irrigotion!—No.
- 21. Q. (Mr. Muir-Mackenzie.)—Out of those 18 lakhs spent how much cams oot of the fands of the District Board?—I believe a lakh and-a-half, roughly.
- 22. Q. If oll the schemes you hove enggested—the canols from the Baguntty and the opening out of sloices—were udopted, how large a proportion of the area weald he protocted?—I calculate the first would do six hanared square miles. I should have to work out the rest. I may put it at four handred square miles; that is, o total of 1,000 square miles or a third of the district.
- 23. Q. That woold not obviate the necessity of famine relief being given in the remaining two-thirds. That

is all that could be dene P How about well irrigation !-Well irrigatioo seems to bring the cost up to such a tromendous amount.

24. Q. I see you want 128 lake to protect and of the district entirely, with one well for each ten acres for one thoosand soone miles. Evon supposing monsy was fortheoming, would it be possible to get n well for each ten acres in the district?—So far as unatural characteristics go, I should say quite possible.

25. Q. Do you consider that the famine work undertaken in the scarcity of 1896-07 was as a seful as could be devised?

—I think under the circomstances yes.

- 26. Q. If you had more time to think it ont, coold you have improved them?—The difficulty of famine relief work is in completing it. It would not be advised here to make a pain to a river and Isave the month open; you want to make a sinise to control it, oud if you go in for a very large prevision of pains, it means a lot of money for permanent improvemonts.
- 27. Q. Did you open ont pains largely?—There is e ecrtain umoont dane; I should like to see more dooe.
- 28. Q. Have you anything to do with the famion pragrammes?—Yes. I have got a large survey made recently for the improvement of a river, the Bya in this respect. I shoold like to have further surveys for suitable famine relief
- 29. Q. What is that ?—It is the Bya river in the south-west and sooth of the district.
- 30. Q. Thut would require a certain amount of expenditure on head-works?—Yes, coosiderable.

- 31. Q. It was in anticipation of famine?—Yes, whon Mr. G. W. Disney.
- 32. Q. But do you think these pains so valuable that you would like to see them started as works of importance before any famine was approhended?—Yes.
- 33. Q. What extent of country would they irrigats?— From the Bya river about two hundred square miles
- 34. Q. What other work was dons in the famine besides making reads?—A good number of tanks were dug.
- 35. Q. Would it be possible to replace all these works by so. W. Would it no possion to replace all these works by works useful for irrigation?—No; only a small proportion. The scotland area of a pain is so small that labour would be distributed plang it and would be on manageable.
- 36. Q. The country is not soited for ahars?—Yee, in Sitamarhi, where the grades are steeper.
- 37. Q. Are they suitable for famine works?-No, they are too small.
- 88. Q. (Mr. Rajaratna Mudaliar.)—Would zomindare be idelined to construct some of thess pains !— I caunot give you an opinion on that.
- 30. Q. Could the cutting that was made in the last famine, the Bagmatti Canal, be utilised for the completion of the work?—Yes, it is not filled up to any great extent.
- 40. Q What was the amount spent on that cutting in the famine?—Rs. 30,000 spent on work and Rs. 22,000 spent on the acquisition of land.
- 41. Q. So to that extent the cost of the work woold be reduced ?-Yes.

# WITNESS No. 33.-ME. M. H. MACEENZIE, Planter of Tirhoot.

- 1. Q. (The President.)—How long have you known this district?—I have been here about 25 years.
- 2. Q. What part do you know best ?- The Sitamarhi Sub-division.
- 3. Q. What schemes woold you advocate for helping it through another famine?—Where I am the Lakendai river ruas throughout the whole country, and there is a system of bunding the river at intervals; the overflow of the water is allowed to pass on to the land by means of small entires from the books to the river; and any coheme which would tend towards improving the existing arrangements would be practically all that is necessary.
- 4. Q. Is irrigation necessary for the crops?—In hardly any year do they do without irrigation to help on the rico
- 5. Q. Does the damming of the river create disputes among the zomindars and enlitivators?—No; the system is morty well recognised. But the bunding should be regulated, so that there lower down the river chould be given an umple sopply of water by passing it on. Encrmons masses of water rnn to waste in the chaurs at present. There should be side channels loid out with chauses.
- 6. Q. I suppose the present irrigators would claim vested rights. Prubably those at the upper end of the river get a far larger share of the water than those below fit is not so much what they use. There is ample water with a proper use of it. The Bagmatti with a proper scheme would give an ample supply right down through its whole course. its whole course.
- 7. Q. Would you allow new bunds and now pains?— It is difficult to soy what is now and what is old. A bund has always to be mode on a different site every year because the rush of woter securs away the eite.
- 8. Q. Is there enough water in the river for that ?-In a year like thie there would have been sufficient, but in the

- fumine year of 1896-97 the water was short. There was a Mr. M. H. bund in that year and there was opposition to criting it, Mackenzie. Above, too, there was not a full supply, because the water was ruu to 28 Oct. 02.
- 9. Q. Would you require a responsible overseer to be put in charge to see that the water was properly disposed of f—There would have to be some control.
- 10. Q. And a cortain amount of outloy. Would the district bear it?—A very light cess would cover the cost of such works as I propose.
- 11. Q. The general cooclusion in the Soran evidencs was that it would be desirable that the existing system of canals shoold be put into really good working order at the expense of the District Board by whom a leau would be made, and they would repay it by a cess?—No inoderate cess would be objected to if there was a corresponding benefit.
- 12. Q. (Mr. Muir-Mackenzie.)—Is the river sufficiently colloned at present !—In most places where it overflows they have thrown up banks: that is, on the
- 18. Q. (Mr. Allen.)—The bunds in the Lakaudai simply cot as weirs; the water passes over them ?—No.
- 14. Q. Well, whot happons to the lawer bunds? How do they got any water at oil?—That is whot I complain about, The water should run back into the river.
- 15. Q. Then so long as appor bunds last lower bunds got no water?—Practically.
- 16. Q. Bot if the Bagmattl were thrown into the Lakandal, what would be the effect?—If toe much wore thrown down, it would make the side channels still more essential.
- 17. Q. What would he the area that this Bagmetti schems would assist?—It would give a good supply of water to the whole length of the Lakendni.
- 18. Q. How many bunds are there in the Lakhandyo?-They vary ; seven or eight perhaps.

# WITNESS No. 34 .- Mn. ROWLAND HUDSON, Planter of Tirhoot.

- 1. Q. (The President.)—How long have you known this part of the country?—Since 1872 Tirhoot and Cham-
  - 2. Q. Is sugar much grown in Tirhoot !-- Yes.
- 3. Q. With well irrigation ?-As a rule, without irriga-
- 4. Q. I suppose it is essentially a crop which would be improved by steady irrigation?—Yes.
- 5. Q. Would the water be taken every year?—Almost every year unter should be used in February and March and probably up to July. 6. Q. Poes the success of the enterprise depend upon the introduction of irrigation?—No. Tirboot, Champeran,
- End introduction of irrigation r—Ro. Airmoot, Onamporan, Saran and Rungpur are the only districts in India in which sugareane can be saccessfully grown without irrigation. The land in the above districts retains its moisture, prob-

Mr. Rowland Hudson.

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Mr. Rowland Hudson 38 Out 08

- 7. Q. Would you advocate irrigation as a protection against famine?—Certainly.
- against famine f—Certainly.

  8. Q. What scheme would you propose f—The scheme proposed by Mr. Disney. He proposes putting claims in the existing bunds, which were made to prevent river flood water from running over the country in uncontrolled quantities. High ridges on the watershod should also he ant through and coluices put in the authings. The offset would be preciselly unlimited. If you get water in one chaur by cutting through a narrow ridge, you may get it into another from it by the same process and so on. This in itself would do a great deal af good, but I think it should be supplemented by a scheme to raise the level of the rivers in dry seasons ceveral feet. The ordinary bunds made for this purpose are open to the objections that they are swept away in flood time, and are very aften the cause of disputes. Falling weirs would be permanent and much more effectual.
- 9. Q. Would you want to raise the beds of the rivers?-Na.
- 10. Have you any idea where this is to be done?—In the little Gandak running right through Champaran and Tirhoot it would do a great deal of good, and in many amaller rivers nearer to the Nepal frontier.
- 11. Q. It would be an expensive work?—Yes, but it would be an insurance against having to spend an enormona amount to save the people in the event of a famine.
- 12. These woirs would necessarily he accompanied by distributary channels?—That would be o small motter. Existing water channels, which are empty in the dry season, could be utilised in many places.
- 13. Q. Would the people take water every year?—I think so. The average rainfall is about 45 inches, but a great deal depends on whether it is seasonable or not.

sbly owing to ito proximity to the hills. Irrigation will
give an increese in the yield.

7. Q. Would you advocate irrigation as a protection against famine?—Certainly.

14. Q. It would make this difference that if money were laid out upon these schemes out of the existing local funds of the district, if they take water every year, a water rate can be put on?—Then it would be necessary to measure the water, and that would be necessary to measure the water, and that would be necessary to measure the water, and the would be necessary to measure the water, and the would be necessary to measure the water, and the would make this difference that if money were laid out upon these schemes out of the existing local funds of the district, if they take water every year, a water rate can be put on?—Then it would be necessary to measure the water, and the would make this difference that if money were laid out upon these schemes out of the existing local funds of the district, if they take water every year, a water rate can be put on?—Then it would be necessary to measure the water, and the would make this difference that if money were laid out upon these schemes out of the existing local funds of the district, if they take water every year, a water rate can be put on?—Then it would be necessary to measure the water, and the would make the water water water and the would make the water wa

- 15. Q. Would not a cess create opposition?—I think it would be difficult to levy a cess which would be relatively fair. Raynts in certain areas would have to be assessed at similar rates, and some of them would derive more hencit from the solumn than others. For example, a rayat with a large holding would nay, eay, one rupee a year; owing to the position of his bolding he will be benefited to a great extent. The effect of the increase of the produce of his holding would be to lesson the value of the produce of a rayat who is loss fortunate in the position of his bolding and wha would derive little or no benefit from the scheme, while the latter would also have to pay hie water rate of one rapes. I should be inclined to carry ant the scheme as an insurance against famina and out of the funds of the Imperial Treasury. We have a population of a thousand to the square miles here, and it would take a great deal of money to save the people in a famine year. I do not say that it would not be possible to levy u cess for up-keep; that would be infinitesimal, and I think cheerfully paid.
  - 16. Q. Would sugarcane growers pay rateo?-Yes. ,
- 17. Q. How much per acre?—I cannot eay. Probably Rs. 5 or Rs. 6 for mesenred water.
- 18. Q. (Mr. Muir-Mackenzie.)—In the neighbaur-cod of Poona we demend Rs. 50. But then you enlivate bood of Poons we demend Rs. 50. very highly and get a very lerge outturn.
- 19. Q. What do yau get por acre?—From the smaller varieties about 12 tens and from the larger from 15 to 25.
- 20. Q. (The President.)—Would you causidor the advantage of irrigation F If canals were made, would you be inclined to grow sugar in the districts which would be irrigated by them, say, in Champaran P.—No. I would not. Others might do so. I must work the praperties in which I am interested. The country which would be benefited by the Tribeni Canal is essentially a rice country.

1. Q. (The President.)—You have seen this district in time of scarcity?—Yes.

2. Q. What is the best policy to prevent the evil effects of famine?—Improved irrigation.

- 3. Q. How?—The lands in this district are of different inde. Some are benefited by irrigation and some do not kinds. Some are benefited by irrigation and some do not require it. If the irrigation is taken over by the district officer, so that people living along all parts of it are equally benefited, that part of the country will be quite sufficiently irrigated by the present sources. And where we have not got sources of irrigation, by excavating the tanks it will be sufficient, and a small tax will be required to be realised from the product of the small cost from those interested and that will pay far the small cost.
- 4. Q. Would you like to eet the Government make more points? Yes; sometimes pains are necessary and with sinies gates, because otherwise one man gets all the benefit of a bund. That is where we want control.
- Q. Who is to exercise that aentral?—The district officer. But any big echeme is not desirable.
- 6. Q. Da you know the Bagmatti ochemo?—Yes. I think any more water rushing from a very hig river ta n river of a narrow channel will be sometimes very dangerons. It may da good in some years when there is no water in the river, but in some years it will be difficult to pass so much water. water.
- 7. Q. Would you tax each particular pain?-Yes-
- 8. Q. (Mr. Muir-Mackenzie.)—le thore any room for the extension at well irrigation?—A good deal more might

WITHESS No. 85.—BABU BISHWA NATH, Zamindar and Indigo Planter, Muzaffarpur,

be done with Government advances returnable at ten or fifteen years; also for tanks.

9. Q. Are the tanks used for irrigation?-To some

10. Q. (Mr. Rajaratna Mudaliar.)—Are the people anxious to take leans, and is there any difficulty in getting them?—Yes, they cannot get from private persons; and there is delay in getting leans from Gaverament. Some special forms should be laid dawn for an officer far realising ned distributing the amount by the officer going to the village himself and getting the lean from the man who ewes it. Sending a chaprasi increases the burden of the lean.

11. Q. Do you think the district officer might advantageously dishurs a loans on the spot P-Yos.

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12. Q. Would zamindars be able to disburse loans?-The Deputy Collectors will do it better than the ramindars.

13. Q. Are there any pains in your zamiadarl?—Yos some private ones; but up to this time nono made specially for the benefit of the rayats.

14. Q. Is the nakdi system in force in your ramindari?—
Yes, and in taxation particular attention should be paid to
the fact. In a fixed area held on a fixed rent; if it yields a
better crop, we do nat get anything more; and if the cess is
levied on revenue like the ambankment cess, we shall have to pay for the benefit derived by those rayats.

15. Q. Don't they pay balf?-They should.

16. Q. But suppose you execute improvements you have the power to enhance the rent P-It is hedged round with forms and restrictions.

WITNESS No. 36 .- MB. A. T. CHEISTIAN, Sab-Deputy Opium Agent, Tirhoot.

28 Oct. 02.

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28 Oct. 02.

Mr. A T. 1. Q. (The President.)—You are Sub-Deputy Opium Christian. Agent in this district ?—Yes.

2. Q. In the whole of Tirhoot ?—Yes, Muzassarpar and Durbhauga.

- 3. Q. That entails your travelling about a great deal among the people, and so you have been able to see their wants?—Yes.
  - 4. Q. Have you been long in this district?-Since 1896

'5. Q. Were you here during the famine of 1896-97 !

6. Q. De you find any strong desire expressed for arti-ficial irrigation bere ?—In certain parts of the district heiai irrigation bere?—In certain parts of the distinct where they irrigate they are very auxious to get well advances for the irrigation, but in other parts of the dis-trict they do not irrigate and depend on streams and ahars for irrigation; there they do not ask for well advances.



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- 7. Q. If it were possible to introduce into this district an irrigation system, such as the Souc Canul, do you think the people would pay for it?—It would ull depend on what they had to puy. If it was u small amount, I dare say they would willingly pay it and utilise the water.
- 8. Q. In places where they do not irrigate ?—In some places I have introduced irrigation, and once they have taken to it they have kept on irrigation.
- 9. Q. Was that irrigation by wells P-Yes, we give advances for wells.
- advances for wells.

  10. Q. You have done this on a very large scale; have you not P—Not on a very large scale always. The two reasons I gave rather largely were in 1896-97 and last year. In 1896-97, which was a dry year, I gave advances for 161 pakka wells, 41 old wells repaired and 1,254 kacheha wells. For all that R. 12,406 wers given. The next year 1897-98 we gave advances for 110 new wells, 26 old wells repaired and six kacheha wells only. Altogether Rs. 5,242 were given in this way. Last year we gave advances for 56 new wells constructed, 113 old wells repaired and 931t kacheha wells. The total amount given was Rs. 7,879.
- 11. Q. When you give an advance for a well it is coupled with the condition that the man who takes the coupled with the condition that the man who was the money will grow a certain amount of opium-pappy ?—Yes; we only give advances to poppy ould rators. Some of thom engage to give a little extra area semetimes Suppose a man's well falls in and his well is made for irrigating poppy os well as other crops, then we give him an advance.

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- 12. Q. Doce he confine himself to poppy or does he grow 12. Q. Doee no conine himself to poppy or does he grow other crops P—Ho grows other crops and he uses the well as well for the other crops. We generally give an advance to three or four cultivators together. They always use one well among three or four men, or somstimes more, according to the situation of the well. In Tirhoot they can irrigate about 10 acres round about one well, but not everywhere. In companions that cannot irrigate about 10 acres round about one well, but not everywhere. where. In some places they cannot irrigate more than two or three acres; but where they do not require much water, only one or two waterings for the whole season, they can irrigate more. irrigate more.
  - 13. Q. Have you been troubled with these wells running dry !—They very often run dry, and that is how we give advances for despening wells.
- 14. Q. Do they deepon very freely?—That ogain depends. In certain parts they can do it freely, but in other parts where they have got quicksinds below the surface, they require appliances to go through it. In some places they can sink them very easily.
- 15. Q. What does it cost P-Our average cost is about Rs. 50 to 60 per well.
- 16. Q. Ie that the amount for a masonry well P—Well, it is not quite a masonry well. They simply use burnt bricks and they do not use any mortar. If they use mortar a well costs about Rs. 260. For the purposes of irrigation they have usually these inexpensive wells.
- 17. Q. (Mr. Muir Mackenzie.)—What is the usual depth to the water source?—That also varies very much, but the average depth is from 20 to 40 feet.
- bat the average depth is from 20 to 40 feet.

  18. Q. (The President.)—De they grow poppy without irrigation P—Yes, we have got about 30,000 bighas here, and ont of that we have a little less than & irriganted; the rest, say about 10,000 bighas, is unirrigated. The proper area for this year is 28,600—about 17,000 acres. The total area altogether irrigated is about 8,000 acres and the rest is unirrigated. Out of the unirrigated area, however, although we call them unirrigated, they use water from the different streams, whonever they can get it. For instance, in the Madhubani Sub-division, although the callivation is called nuirrigated, they manage to get water every year in the mannual ope-airsion, although the califyration is called nuirrigated, they manage to get water every year nearly from some streams. 8,000 bights are irrigated from wells; some of the other is not irrigated at all, and the rest is irrigated from streams, tanks and chaure.
- 19. Q. Where they have wells do they use them freely overy season P—In the parts we call irrigated cultivation they use them overy year whether there is rainfall or not.
- 20. Q. With your knowledge of the district bave you may suggestions to make as to how we might be better prepared for famine in Tirhoot ?—I think we can improve well irrigation, and as regards the irrigation from streams, I had a talk with Mr. Mackenzie, and his proposal is exactly what I suggest, viz., the hunding up of the streams and giving water from gaine, chause, etc. water from pains, chaurs, oto.
- 21. Q. There is a great deal of that as it is ?-Yes. In fact. I think quite six or seven thousand bighas of the un-irrigated laud are irrigated by the last means.

- 22. Q. (Mr. Muir-Mackenzie.)—The granting of nd. Mr. A. T. vacces for wells is by no means your only business ?—No. Christian. That is only one part of it.
- 23. Q. Da you generally give your opinm advances to tenants ?—Yrs, to all sorts of people : not only to occupancy tenants, but to any man who is brought forward as a gennine oultivator.
- 24. Q. What is the security. P—Generally there is a middleman or hathidar who bringe about 20 or 30 cultivators. These cultivators come to us jointly and suy they want advances and we give it to them on their joint personal
- 25. Q. You don't take lunds as scenrity ?-Only in cases of well advances. Then we take immoveable property as
- 26. Q. Do you always take immercable property in cases of well advances?—Generally. There are special cases where three or four men come to us for advances and wo give it to them on their joint scenrity if they are good coltivators.
- 27. Q. Mr. Tytler employed that combination principle a great deal?—Yos, he used to do so mere, because he had more occupancy tenunts there, and there are more permanent cultivators in his district. We cannot do here that, because in dry seasons our cultivation fluctuates a great
- 28. Q. (The President.)—What brings it down in a dry season? Is it want of min?—Yes.
- 29. Q. Cunnot wells replace the min ?-Generally the wells have a sufficient supply of water, but it is in places where there are no wells that the difficulty is felt, and they do not generally sink wells or construct wells here in places where they are not used to making wells. In some places ugain there are difficulties such as quicksands which caunot be got over. In other places they are no used to irrigation, and they have an idea that if they irrigate once, they will always have to irrigate. In some places again the cost is too much.
- 30. Q. What is the period for repayments of leans?—Within two and a half years from the date we advance thom the money.
- S1. Q. Do they never ask for any longer periods P— Sometimes they do. Last year in several cases people asked for time and we gave them another six months and in rare cases we have given a year's time.
- 32. Q. Do you have any difficulty as regards repayent?—No. Failnres to recover advances are very few and we very seldom have recourse to law.
- 83. Q. De you think, if you allowed people a longer period to ropay, they would be more forward in applying for advances P—I dare say they would; but so for as our department is concerned, we do not want to make money arrangements of that sort.
- 34. Q. What rate of interest de you charge?-No inter-
- 85. Q. Whon is a man's instalment paid? How soon effor the advance to him?—A man to whom we advanced mency this season will not pay back his first instalment till April 1804. Then the second instalment will fall due in September 1904 and the third one in April 1805. Ho pays back the money in three iestulments, but then he does not have to pay back anything for one year.
- 36. Q. That gives him time to make his well and grow his orope ?-Yes.
- 97. Q. I gather you have not succeeded in making wells popular in tracts where they need to be comparatively nn-known before P-No. In parts of Durbhanga close to Samsstipur we got a few cultivators to try. Where they did try and made wells, they kept to irrigation, but it is very difficult to get people to take to it in new places.
- SS. Q. In Samastipur has it epread in consequence of the action you have taken?—No. In only about 20 villeges irrigation is used.
- 39. Q. In consequence of that has the example been copied?—No. There are only 20 villages to which it has been extended, but not more. That is nothing very much
- 40. Q. Does well irrigation largely increase the yield of poppy?—Yes, it increases the yield much more than canal water does, I think, generally. That ugain all depende upon soil. In some places canal water does, but in places where the well water is brackish and soil indifferent, well water is more beneficial. Close about Hajipur they may

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Mr. A. T. Christian

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have rain, but until they irrigate from wells they do not get a good crop of pappy ar anything class: no garden pro-

- 41. Q. I suppose there is a great deal of manure used ?—Yes, in poppy.
- 42. Q. Do you find that where you have encouraged well irrigation they generolly get sufficient water far all operations from the sawing to the finish?—Usually they da, but there are some places where wells run dry. Some of these they can deapen and others they cannot, and so they have to da the heat they con with their scouty supply.
- 43. Q. Same witnesses have said that when wells are dag you may get enough water far late watering of the crop, but that you connet rely upon wells at crapping time?—That is the case in several villages. In irrigated tracts, a few miles santh of Muzasserpur, we have only get to go 20 feet and we can get a sufficient supply of water all the year round.
- 44. Q. And yet irrigation has not vary much extended in that part?—In every village overy hit of land is irrigated there.
- 45. Q. Is it your business ta press the people to take well advances? Are you ancoaraged ta press the people to take well advances?—No. They come of their own necard. We try and encarage well advances by encoareging them to came to us when they want them. We ga to a village and see a well aut af repair and we ask tha man if he wonts my help, but there is no need to personale them at all. If they were pressed, they might not spend all the money in making wells.
- 46. Q. Does the smannt advanced yearly vary very much? Are the number of applications the same, or are they very much increased by the amount of stimulus given by individual officers?—I think a great deal depends on the year. In the two dry years I had very many more applications then in other years. In years when they have a good reinfall people do not think of moking new wells or repairing their aid ones.
- 47. Q. Have you ever found your allotments insufficient?—In these two dry years I have had to nek for further canetion.
- 49. Q. Have you always been able to get your forther sanction ?—Yes. In 1897 I had to mak far three times the amount which was first allotted to me, which was Rs. 4,000.
- 49. Q You could not have get rid of any mere profitably that year? —I distributed it among poppy cultivators. I date say, if I were to have advanced to ather cultivators, we cauld have get rid of more. But we only restrict ourselves to pappy cultivators.
- 50. Q. You have had a lot af experience in advancing to cultivators. If you ware emplayed to advance to ather cultivators, dou't you think you would get rid of a lot more money P—Yes. The peaple seem to have more confidence in us. They have not get to go through a lot formality. In special cases they come and apply to us and any molurair makes enquiries when we ear in camp and we pass through these villages, and the advance can be given within three or four days of the application.
- 51. Q. Ynn are combled to give advances very promptly?
- -Yes.

  52. Q. Dn yon carry tho money about with you?—
  In seasons of draught wa do. As a rule, however, we first make enquiries. All applications are given in July, Angust and September. Nevember to Junuary is the time we make all our enquiries. In Jonnory we pay nur first instalment and then we go an making enquiries and mare advances are paid in March. Then we have get to pay thom a second instalment. We do not pay all in an instalment. We pay the first instalment, and then when the man commences working we pay him his second instalment and their d when they are about finishing.

  52. Q. Who case short inspecting the work?—I inspecting
- 53. Q. Who goes abant inspecting the work?—I inspect in the naid weather and my two ossistants also inspect in the cold weather and anr native staff makes enquiries abant the security. These scourity enquiries naturally occupy about three or four days. There is very little difficulty about

security. The men are generally truthful, and thought does happen sametimes that we come across a dishanest man, my experience is that they are fairly haacst, and they knew that if they deceive us once they will never be able to show their faces to us agolu. I have recovered every pies at the advances with the acception of the instalments still due and for which the periods have been extended. We have seldom to have recourse to law to collect our money. They know that if they pay up promptly, they will get advances ugalu when they want tham.

54. Q. They do not aften ask you for a postpanement of payment af instalments?—They dan't ask very aften accept when there is a dry season ar when there is a bad season far apium.

55. Q. Do you grant it?—Generally it is granted. Of course up to a year it is usually granted, but if it goes beyand, we get the Opium Agent's sanction.

(Witness again described haw men came to him for advances, and after enquiries had been mude by his staff they made a report to him an which he again made angulries.)

- 50. Q. (Mr. Muir-Mackensie.)—I dan't see from all yan have said how your advances are given within three or four days of the upplication?—That is, when a special mon comes and says his well requires rapelts, I go' and inspect it and give him an advance. These are special cases. What I have described is the usual pracedure. When a man has got the time he follows the usual pracedure. In special cases there is nothing to provent him making his application at any time during the cold weather.
- 57. Q. Then yau can manage to get all your enquiry done in three or four days ?-Yes, in argent cases.
- 58. Q. (Mr. Rajaratna Mudalian)—Yon soid that the cultivators come to you for advances overy year ?—Yes.
- 50. Q. Then there applications are prahably chiefly for the expenses at cultivation and not for wells ?—That is for cultivation entirely. That has nothing to do with wells. Wells are entirely a separate department.
- 60. Q. What proportion of advances go for cultivation and what proportion to wells?—Advances are all far enlitivation. There are special men who want to sink wells. I have 70,000 cultivators. Out of these 200 or 300 ar 400 may apply far well advances.
- 61. Q. The advances are repayable within two or three years?—Opium advances are paid from the produce next agason.
- 62. Q You spoke of middle-men bringing up a number of coltivators. Who are these middle-men f—They are themselves caltivators. They are a little better off than all the other enlivators. The caltivators themselves select these men in represent them and bring them up, and we depend an these middle-men far information as ta whether a particular caltivator should be trusted or not.
- 69. Q. Don't you think that these cultivators will be at the mercy at the middle-men. For the favourable recommendation that these middle-men gire to the athers they might probably expect some remnasmion from the others?—There are rates fixed far these men at eight annas a bigha. They cannot demand more.
- 6i. Q. Does a middle-man nadertake any responsibility?—He slong with the others. Ha is to a certain extent responsible that these men are salvent and that they are genuine coltivators, but the responsibility is for everyone under tha license.
- 65. Q. (Mr. Muir-Movkenzie.)—Is it essential that a man should have a middle-man's recommendation before he can get ndvances for wells ?—Not always. Sometimes, if wo know men are solvent and have proporty, we give them advances quite independently at middle-men. Very after ramindars apply for well advonces. Some months back we gave an indigo plonter, Mr. Severs, of Murpa Fastory, its. 210 for 70 kochcha wells.
- 66. Q. You realise the odrances for cultivation before the opinm crop is removed f—We weigh the upium, dedact ndvances and pay them.

Wirness No. 37.—Me. T. Burten, Superintending Engineor, Muzastarpur.
(Replies to printed questions.)

Mr. T. Butler. 28 Oct. 02.

I.—Theireport refers to North Bihur comprising the districts of Champaran, Tirhuci, Durhhunga and Saran. I was emplayed an surveye for canals in North Chemparan

far six months in 1897, and have been Inspector of Works in these districts since March 1898.

North Bihar, as regords irrigation questions, may be divided into two parts, viz .-

- (a) The submontane tract comprising that portion of Champaran north of the Sokrana or Boor Gandsk river, and that portion of the Tirhoot and Darbhunga districts 15 to 20 miles south of the Napel houndary.
- (b) That portion of North Bihar south of the anbmontane section.

In (a) the soil is either sandy olay, or elay locally termed bhangar" for n depth of 2 or 3 fest, below which is sand. This soil does not retain moisture, and hence requires plentiful rain or irrigation to produce good crops.

Rice is the crop chiefly cultivated in this tract.

In (b) the soil is chiefly a white learn, very retautive of moisture, and, when enlitivated, the moisture rises to the surface. Indian-corn, indigo and rabi are the orops chiefly cultivated. Rice is grown only in the low lands or chaurs on which more or less water remains in ordinary Years throughout the rainy season.

II,-The average annual rainfall is-

(a) 60 inches.

(b) 48 n

but the value of the rainfall to the crops depends not so much on the total amount of min that falls during the year as to whather it falls at a sultable time for the crops.

rops.

III.—In (a) the only existing canal is a small one, 6 miles in length, named the Madhinan; but the water from the numerous bill streams which cross this tract is utilized by the cultivators by means of small inundation channels locally called pains, and when the supply in the streams falls at the end of the rainy season, earther dams are often canetructed in them to supply water through the pains. Most of these otreams spill over their banks in high flood, and submerge the country on both sides; but as the slope and submerge the country on both sides; but as the slope of the country is from 4 to 6 feet per mile, the flood-water nenally passes off quickly and is beneficial to the kharif

Early in October when the rain ceases or when there is any considerable break in the rains, the supply is most of these hill streams falls very low or dries up altogether, as most of them are bunded in Nepal territory, the only exceptions being the Gandak, Bagmutt and Kumla which hove a considerable supply throughout the year.

In this tract, when the supply of water is sufficient, magnificent rice crops are obtained, and the only obstacle to irrigation is the nacertainty of emply if the water is taken from the smaller streams, and the lack of funds to construct schemes from the larger rivers.

Two canals are now hoing constracted by Government, viz., the Triheni Canal taking off from the Gandok river to irrigate 50,000 acres of rice in North-West Champaran, the length of the main canal to be 60 miles, and the Dhaka Canol taking off from the Lal Brackoye river to irrigate 15,000 acres of rice in north-east of Champaran, the length of the main canals being 19 miles.

Preliminary investigations have also been made for several smaller canals.

In (b) the only canale are these in the north-west of Saran which were constructed about twenty years ago. They consist of 4 sluices in the flood embaukment on the right of the Gandak river. These sluices are applied from a sofa of the Gandak river which rens porallel and close to the field embankment. The sluices discharge into four natural nullshs which extend to the west and south of the district.

During the flood season an ample supply can be obtained through these sinices, but there are no means of distributing it from the nullahs. After the flood season, n supply can be obtained through these sinices by making carthen dams in the sola. These canals have proved a failure chiefly on account of the uncortainty of the supply and the want of means of distributing and controlling the sapply in the

Irrigation is required only in an unusually dry year or when the hatia rains fail, and in the latter case the level in the sate is often too low to send a supply through the sluices without constructing an earthen dam, and such a dam cannot be constructed till the discharge of the sota has reduced, and it is then too late to irrigate the rice crop.

VII.—There are as yst ue canals of continuous flow in North Bibsr. The Madhuban Canal cannot be classed under this head, as the discharge of the river Tenr which supplies it falls very low when the rains cease.

XII .- The Madhaban Canal takes off from the Tour ever just helow the Nepal frontier. There is a masonry weir in the river and head sluice and bridges on the cans! which is only 6 miles long.

There are no distributies, only some small villoge channels constructed by the cultivators. If sultable distributing channels and regulotors were constructed, the area that could be irrigated would be considerably extended. At present the water flows as hest it can from field to field, and has to be litted on to the higher-lands, and there is a considerable weater. The Tenr river is a bill residue from Napal, and the fixed rice and fall rapidly, and stream from Nepal, and the foods rise and fall rapidly, and after the 15th Ootober the discharge is small, and in a dry year is not more than 50 cabia feet per second; hat in a year of ordinary rainfall the supply during the kšariji season is sufficient to irrigate all the area commanded by

XIII.—Rice is grown on the greater part of the area commended by the esnal, and in years of scanty minfall the produces from the fully-irrigated crop is double that from the unirrigated crop.

XV.—There are several tanks in the area from which in a dry year the onliveatore lift the water for irrigation of the rice crop, but this seems of supply is seen exhausted.

XVIL-No water-rates are levied for irrigation from At 11.—No water-rates are lovied for irrigation from this canal owing to some faulty agreement with the zamindor when the canal was constructed, and the cost of mointoining the canal is home by Government. If suitable distributing chonnels and regulators were constructed by Government, it would probably be possible to realise sufficient water-rates to cover the cost of maintaining the

The Saran Canals, which were constructed about twenty years age, were for ten years worked under a guarantse from the planters of the district, who paid a lump sum yearly and were ullewed to realise from the cultivators what water-rates they could under the rules. They found it, however, impossible to realise a moiety of these water and the paid of the water, and home rates owing to want of control ever the water, and hones did not renew the guarantee, and the canals remained closed for several years. In 1896-97, and again in 1900 and in convent year the canols were, at the request of the Civil antherities, with the idea of mitigating the impending scarcity, opened at the end of the kharif senson, no charge with the invention from them. being made for the irrigation from them. The area irrigated was, however, small.

Full details regarding the Tribeni and Dhaka Canals, now ander construction, are given in the reports which accompany these projects.

These, with the Madhubau Canal and two small canals proposed from the Telawge and Pussa rivers, would irrigate the whole of that pertien of the Champaran district which requires irrigation, except a small strip north of the Triboni Canal, which must depend for Irrigation on the pains taking off from the bill streams. These pains would be much more useful If they ware hetter allowed and exercisbe much more useful if they were hetter aligned and previded with head cluices. The supply from those hill streams, though small in a year of drought, would probably he sufficient to irrigate the greater part of this area.

Note on the proposal made by Sir Thomas Higham, Secretary to Government of India, to increase the capacity of the syphons on Tribeni Canal.

Sir Thomas Higham proposed to increase the width of each vent of the syphons from 6 to 8 feet.

There are to be six such syphons on the caush viz .-

	M		ft.		
Chota Bhu	bsa at 1	١.	. 1,420	with 10	vents.
Bara Bhuh	ea nt 19		. 1,500	,, 10	12
Masan	at 3		. 1,580	, 8	31
Hurbora	at 41	3.	3,720	,, 7	91
Pandoyo	ot di	3 .	. 2,560	,, 7	\$3
Moneari	at 5	. 8	4,240	,, 6	17

Mad eluice .- The head sluice will have 22 vents each N'XA'.

There will be khnrriss in front of the vents so as to take off water from the serfoce enly.

T. Butler.

28 Oct. 02.

Mr. T. Butler. 28 Oct. 02. It was calculated that a depth of 23 feet over the khurries would give a discharge of 2,028 cusees, and that with this discharge the velocity through the sluies vents would be 3.85 feet per second. By increasing the depth over the khurries to 3 feet, a discharge of obout 2,500 onhit fee could be obtained. The difference of the level of the river and full supply in canal heing in October about 2 feet.

Syphons.—The vents of the syphons were designed 6 feet wide and 6 feet high from floor to arown; the arch subtending an angle of 60°. The height of the Manaari syphon was to be 63 feet.

The area of such e vent 6 feet would be 3,411 square feet. It was assumed by the Chief Engineer, Mr. Buckley, that the head at the syphon would give a meen velocity through the vents of 7 feet per second.

The discharge through the syphons would therefore ho-

Chota Bhubsa 10 × 3,444 × 7=2,410 cusocs 2,160
Bara Bhubsa 10 × 3,444 × 7=2,410 ,, 2,109
Mesau 8 × 3,441 × 7=1,028 ,, 1,670
Hurbora 7 × 3,414 × 7=1,687 ,, 1,207
Pondeyo 7 × 3,414 × 7=1,687 ,, 920
Maneari 6 × 3,744 × 7=1,572 ,, 780

The discharge required below each syphon to irrigate the cammanded area of rice on the caual and its proposed extension taken at 200 aeres per square mile is printed in italio figures. When the original design was prepared the relocity through the last 8 syphons was calculated at only 6 feet per second, and this would reduce the discharge through the Hurborn and Pandoye to 1,416 encess and through the Maneari to 1,318 exsecs.

The discharge through the syphona after allowing for the irrigation of 200 acres per equare mile with a duty of 50 acres per oused on the Tribeni and its proposed extension would therefore give a curplus of—

Chota Bhubea			260	curees.
Bara Bhubsa			301	1)
Masan	•		358	10
Hurbora			239	7)
Pandoyo			526	17
Maneari .			568	

This surplus discharge would be sufficient for irrigating the area to the east of the present proposed terminus of the extension, viz., the Tellays river provided that the two assumptions, viz., that the area of rice requiring irrigation will not exceed 200 acres per square mile, and that there will be a velocity of 7 fest per second through the first 3 syphons and 6 feet through the letter 3 prove correct. There are 16 aqueduets over other streams besides the above syphons; the width of the aqueduets and their discharges are given in the annexed table:—

Serial No.		Width.	Dischargo.	Volocity.	Whon onlarged velocity in canal.		Increased discharge with same volcater if depth was increased 6 inches.
		1	ĺ	1		Brtdgo 10	Curces.
1		70	2,160	4.31	322	spaus, 8 ft.	154
1 ( 2		70	2,155	4.39	2:91	D-/3 10	113
2 { 3	•	70	2,030	4.18	2:55	Bridge 10 spans, 8 ft. Bridge 10	116
4		70	2,025	4.11	2.55	spans, 8ft.	145
5	•	65	2,000	4.40	253	*****	143
6	•	63	1,970	4.33	2.35	Bridge 10	141
71		GS	1,900	4.18	210	spans, 8 ft.	136
8		60	1,800	4.28	2 10		128

Sorial No.		Width.	Dischargo.	Volocity.	Whon onlarged volocity in canal.		Inorossod discharge with same releoity of dopth was inoreased 6 inches.
3 3	•.•	60 55	1,700 1,600	4 05 4 16	2·10 2·10	Bridge 10 opans, 8 ft.  Bridge 8 spans, 8 ft. Bridge 8 spans, 8 ft.	Cusaes. 122 114
L11	٠	55	1,500	14.2	2.00	******	116
13		50	1,300	40	2.00	*****	100
4 [13	٠	50	1,200	8.7	2.00	Bridge 8	- 98
5 11	•	30	700	8.9	1.83	Ditto	59
6 (15	•	30	600	3.7	1.83	Bridge 5 spans, 8 ft. Ditto.	56

The italia figures show where the syphons come in.

From the above it will be seen that there must be a small afflux at each aqueduct to increase the velocity from that in the abannel to that required to carry the discharge through the aqueduct, as the difference of coefficient between a masonry rectangular and a trapezoidel earthen channel will not give the necessary increase in velocity. To increase the discharge through the aqueducts by another 150 enbic fect without increasing the velocity, it would be necessary to widen those below No. 6, from 1 to 5 ft. The bridges up to aqueduct No. 8 are designed with 10 spans of 8 ft., so that the sectional area of the waterway would be 10 × 8×7=560 sq. ft. and the velocity required to give the full discharge would be from 4 to 3 ft. per second, and this will require a small afflux. If the depth of water was increased by 6 inches, the discharging capacity of the bridge would, without increasing the velocity, be increased from 160 to 150 per second. The waterway of the channel itself is designed when increased to carry supply from the proposed extension to be as follows:—

Reach.		Bed.	Width slops over 1,000.	Depth	Velo- aity.	Dis- chargo,	Dis- chargo with depth in- creased 6".	
Ist			90	0 25	7	8.22	2,181	2,451
2nd			200	0 20	-	2.91	2,180	2,416
3rd			110	0.12	7	2.55	2,033	2,316
4th		•	110	0.10	7	2.10	1,725	1,910
5th	•	•	110	0.10	65	2.00	1,522	1,725
6th			100	0.10	G	1.30	1,297	1,333
7th			60	0.10	6	1.87	261	1,1(6
Sth		•	65	0.10	6	i-83	782	898
Exten	sion		401	0.5	5	219	493	

Œ.

By increasing the depth by 6 inches and making the last two reaches which have not yet been excavated a little wider the canal would discharge an extra 200 cusecs. The hanks are new constructed to 3 feet above full supply, but a margin of 2½ feet would not be dangerons. To increase the discharging eapacity of the cannl by another 150 to 200 cusecs, it would be necessary to widen the aqueducta from No. 7 to the end and raise the water level 6 inches and to increase slightly the width of the channel on the last two reaches and to and another vent to the bridges below aqueduct No. 10.

- 1. Q. (The President.)—You have heard what the various witaesses.—Mr. Growso, Mr. Hodding and others—have said obout the Saraa Canal. Do you generally ogree with them?—No. Their premises were all wroag. The supply of water available is very uncortain; the canals are oaly so-called canals; they are more inundation canals than anything else. They consist of sluices in the flood embankment of the Gandak river with short channels londing from a sota of the river with short channels londing from a sota of the river to the sluices and short channels from the sluices to old spill channels of the Gandok. Whenever there is a supply in the sota during the flood seesoon you can get water through the sluices.

  2. Q. Is there not always a supply in the flood sca-
- 2. Q. Is there not always a supply in the flood scason?—Not always. Generally between the 15th of
  June and the 15th of September you can get in what
  supply is wanted. After the 15th of September the
  flood is most uncertain. If you have a late flood, then
  you can get a supply; if you have not, then although
  there may be an ample supply, the level is too low to
  get it through the sluices.
- 3. Q. Have the silices get their sills too high?—You could not make the sills any lower. You cannot keep the clannels even to the level of the sills. They silt up. The first two or three miles of the canol silt up. almost at onco. There is almost no slope for the first two miles inside the sluices.
- 4. Q. Whot slope is that?—I do not think there is a slope of nn inch a mile for the first two miles. The bed is practically horizontal.
- 5. Q. What is about the slope across the Saran District?—It is about a foot to a foot and a half a mile.
- 6. Q. Then the uncertainty nhout the supply is not the time they want the water the most in the hathia time?—They want it then for irrigating the rice crops in the chaurs, and os described by the other witnesses a plentiful supply of water and not o mere sprinkling is essential for the rabi crops in a dry year.
- 7. Q. Could you not put in strong spurs that would force in the supply?—These would chonge the direction of the sola. The land on both sides is alluvial land (explains on the map).
- tion of the sota. The land on both sides is alluvial land (explains on the map).

  8. Q. At present the water goes where it will. Supposing now that the villagers agree to pay a two piecess, that will produce its. 50,000. Then what are the engineering points?—With that amount you could not do anything to give them a certain supply, and as it is they have an uncertain supply now without going to any expenditure. Even that uncertain supply would tide them ever their difficulties generally. It think any mency spent except in improving the distribution of the water would be money thrown away practically. It will cost a great deal of money to do what you suggest. The rivers which form the cannes are flooded by drainage water in the rainy season. To pass off this drainage and at the same time have means of raising the water level, it would be necessary to construct masonry regulators. Earthen cross bunds with small bye-washes would obstruct the drainage of the country. On the other hand, a moderate expenditure on the distribution inside would meet the enso except, say, in one bad year in 25. I think there is a general impression that the Public Works Department acted in a dog in the manger fashion in regard to these ennals. They would not open them, because originally the people of the district agreed to pay the canals were not opened till last year when the original water in the proposed to pay the canals were not opened till last year when the original water in the proposed to save them from famine. Whenever that cry was raised they were opened free of charge, but as there were interest.

  9. Q. What is the most reasonable thing to de for the futures.—We have not got enough benefit from
- 9. Q. What is the most reasonable thing to do for the future?—We have not get enough benefit from the existing scheme. The existing scheme would give more benefit, if it were settled that we should not charge any rate but to distribute the water as best we can with the help of some money spent on the regulators and channels inside.
- 10. Q. You say that water oan be given except in one year out of 25?—I don't think in a dry hathia we could give them water for the area that they mention. I think we could only do between 20,000 and 40,000 acres, and that only if they took the water before the hathia.
- .11. Q. These witnesses talked to-day about an exenditure of three lokhs?—I do not know where they got their figures from. They have got no irrigotion officer that they could have consulted. I don't think they asked the Chief Engineer or anybody.
- 12. Q. (Sir Thomas Higham.)—Do the channels silt up?—For the first two feet above the sills of the sluices they silt up very rapidly. Above that silting

- does not take place if you do not open the sluico during the high floods. They do not, as a rule, want it open during the high floods.
- 13. Q. Do you have to spend much money on clearing the silt?—None has been spent during the lost four or five yoors. They spent Rs. 40,000 in one year when the canal was guaranteed, but that was too
- 14. Q. What do you suppose would be a fair maintenances charge, supposing it were to be under an ongineer and done reasonably?—Rs. 10,000 a year. Rs. 40,000 was what they spent when the planters gave a guarantee.
- 15. Q. What was the amount of the guarantee?—
  41 per cent. on the copitel cost. I forget the exact amount. It was long before my time. Later on Rs. 21,000 was the amount of guarantee.
- 16. Q. That Rs. 40,000 was spent by the Department?—Yes. They used to spend a lot of money in trying to make cross bunds in the sota.
- trying to make cross bunds in the sota.

  17. Q. (The President.)—I don't think that anything that you have said is really against what these gentlemon advanced this morning. You nro merely showing what they perhaps did not realise—the uncertainties of the supply?—I ogree with nearly everything that was said, except their promises. Mr. Filgote's proposal meets the facts of the case. If you had ents from these rivers into the chaurs and filled them up, it is really all that they want to save the country from searcity, and in addition to this, if they had smaller cuts from all the sluices in the embankment, they would irrigate a very large area of rice. There are 30 to 35 sluices down the embankment, and those sluices now are opened at the request of the cultivators, provided nobody raises an objection. If anybody raises an objection, the Collector has to decide it. By the time the decision is arrived at it is generally too into. Where there is no channel to lead the water from the sluices they are a source of frequent complaint. If water is passed through them, it flows over the adjacent lands causing damage to some lands and benefit to others.

  18. Q. How long would these channels require to
- 18. Q. How long would these channels require to be?—A very short length some of them; none of them would be over a mile. They only want to go into the nonrest chour and then the water finds its way from chang to chan all over the cauntry. If you wanted to spend money for famine protection, I think you would get more protection in spending it in that way than almost any other.
- 19. Q. Could you now tell us about the Tribeni Canal? Could you show us a plan of it?—Witness presented a map on which he explained the scheme to the Commission.
- 20. Q. What will be the cost?—Thirty-seven lakhs for 60 miles. You cannot extend it beyond the Tilawi on account of the only possible nligament having to pass through Nopal.
- 21. Q. Could not some sottlement be arrived at with the Nopalese P.—I expect the Nepelese would claim irrigation for all this here (indicates on map). We would not gain much by it.
- 22. Q. What do you fix the minimum discharge of the Tribeni at?—Sufficient to irrigate 200 acres to the square mile with a duty of 50 neres to the value
- 23. Q. How is the work getting on?—We only storted it last year. It is in un out-of-the-woy part of the world and has a had reputation for fever, and we had great difficulty in getting contractors to go up there. We have made a good start now and I hope wo shall get the first fifteen miles open this year.
- 24. Q. I cannot see why if all that Nepal would ask would be irrigation for the parts you refor to, wo could not give it to them?—I do not know what could be done, but from what one hears about Nopal they would not allow n European in their
- 25. Q. Now please tell us about the other projects?—I would first like to explain what the witnesses and about the pains? The Tribeni Canal crosses 22 streems, of which six are real hill streams which have sandy beds, not more than three or four feet below the lovel of the country. The others are deep nullahs, From all these hill streams they have any number of pains. Now they take nearly every drop of water eat of these streams. The nullahs are much deeper and have fewer pains taking off from them. I think a good deal could be done especially from the two principal streams in regulating these pains. At present there is no order. A man takes as much water as he wants and turns the rest on to his neighbours' lands.

Mr. T. Butler.

28 Oct. 02.

Mr. T. Butler 28 Oct. 02.

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- 26. Q. Do you propose to feed these pains from the canalt—No. The distribution of water from them should be regulated to irrigate the area between the foot of the hills and the canal. That is a very arid tract. The lond is good and it only wants water to get a good erop. They do get good erops wherever they can get the water. It wants some legislation to settle rights and distribute water to the best advantage. If we take the projects in order, the Tilowi comes first. Mr. Dunsford said this Tilowi is never bunded in Nepal. I don't think he is quite correct there. What he means is that such bunding has never affected his supply. There is always, I believe, a certain supply coming down. I think the scheme sketched out in the report would not be a very expensive one. It would be advisable to at first construct only a sluice on the river bank with a channel leading from it to the area to be irrigated. When the water level on the river fell too low to feed the sinice, an earthon cross bund could he constructed to raise the water level. Afterwards if considered advisable the earthon bund could be replaced by a mosonry woir. No doubt we would interfere with Mr. Duasford's little scheme and probably he would want for a certain area for nothing. nothing.
- 27. Q. As regards the Tilawi, supposing the water failed you, you could supply it from the Tribeni extension?—Yes. Any surplus we had could be passed into it. I think we could always depend for a supply from the Tribeni when this extension was made.
- 28. Q. What would he the supply ?—A certain supply of 30 or 40 cubic feet per second.
- 29. Q. (Sir Thomas Higham.)—You cannot work on the Tilawi without a weir?—The idea was to have a weir across the Tilawi and use the water of the Tilawi and any surplus water from the Tribeni ex-
- 30. Q. Then we come on to the Poussa?—That is a very small scheme, but though the Nepalese do bund the river, they cannot bund it till the woter runs low, and even when they hand it, there is a certain amount of water from percolation.
- 31. Q. What does the river do in a dry year ?—It dries up altogether after the middle of October.
- 32. Q. What amount do they get for the hathia?—You get sufficient to irrigate five or six thousand acres for the hathia.
- 33. Q. Next comes the Bakiya ?—The Bakiya is practically the same as the Pousso. The Madhuhani Canal cuts in hetween the Poussa and the Bakiya. There has just been a new distributary sanctioned from it and we expect to be allo't to charge a waterate from that. In the Bakiya we made a cross bund; they probably would make a little canal themselves if we laid it out for them, but they would prohably prefer somebody with anthority like the Collector to administer it.
- 34. Q. Have these sebemes all gone in to the Government of India?—They have been only sketched out

- for this Commission. They have not been actually levelled except the Tribeni and Dhakka.
- 35. Q. Next comes the Dbakka?—Three-fourths of that has been completed. We expect to get water from it next yeor.
- 36. Q. How many cubic feet por second?—It is estimated at 300, but we cut it down to 170.
- S7. Q. Do you want a weir across the river?-
- 38. Q. Then we come on to a bigger scheme, the Bagmatti?—I am afraid that is a very hopeless case. It was commenced os a fomine work. Under instructions I prepared a report for a schemo without a
- weir.

  39. Q. What is wrong with the schemo; no water in the river?—There is water in the Bogmatti, but the difficulty would be to get it into the canal without a weir. You are never sure that the dean without a weir. You are never sure that the dean stream will remain on your side of the river, because the river wanders from side to side. What Mr. Disacy proposed was to moke a canol only for robi irrigation so as to avoid any expense of museary works; that is, to moke a series of long channels, so that the flood water of the river would be allowed to go between them, and he proposes in the cold weather to bund those gaps and put a cross bund on the river helow and thus let the water come down into the Lakandi. If you can do that it might pay, but I am afraid there would hardly be time enough to get the water for the sowing of the rabi erop. It would cutail considerable expense and the people would not care to do it unless they really wanted that weter. Then again, when you get it into the Lakandi, you have no means of distributing it. There is one other point I would like to mention; it is in regard to making channels from the sluices in emhankments. I think that is one of the cheapest and most economical ways of saving portion of the rice crop in a dry season. Mr. Disney has, I think, mode a note on it. It appeals to the men here; they understand it more than anything else. anythiag elso.
- 40. Q. (Sir Thomas Highom.)—Have you sandbag bunds at all hero?—Not usually.
- 41. Q. (The President.)—What about the Dous schemo?—That is in Durbhanga. I know nothing about it personolly. I have never seen the country that could be irrigated from the Dousa.
- 42. Q. (The President).—Then what do you say as regards the Kamala?—On the Kamala I have seen part of the country. It is essentially a rice country. The levels are known; a canol is feasible and the supply is sure, and it would be a really sound scheme. I think the only question about the Kamla scheme is whether the people are willing to pay a water-rate.
- 43. Q. Is that a country with European planters? There are few so far north. The land nearly all belongs to the Durbhauga Raj.

#### FIFTH DAY.

#### Durbhanga, 30th October 1902.

WITNESS No. 39 .- MR. A. H. O. MACCARTHY, Executive Engineer, Gandak Division.

Mr. A. H. C. 1. Q. (The President.)—How many years have you MacCarthy. heen here?—Eight months.

2. Q. Have you any previous knowledge of the dis-30 Oct. 02. triet?—No.

- S. Q. Do you know the Saran canals?—Yes; the regulation of the head sluices is under my charge.
- 4. Q. Do you know the wishes of the people in regard to those canals?—Yes.
- gard to those canals?—Yes.

  5. Q. What is your opinion about them?—Personally I do not thank that any satisfactory project is possible except to make a high level canal and have the central of the water in the hands of the Public Works Deportment. The channels must be properly graded with weirs across them. Then it might work.
- 6. Q. But you cannot say definitely?—No. Thero is no impossibility in the scheme. It is all a question of cost. The canals would get a good supply up to the middle of October, and then they would saddenly

- Q. Are the sluices high and dry for a considerable part of the year?—I cannot say.
- 8. Q. Woald it be any good to lower the sills?—
  I do not know. I have been told it would be uscless.
  I think there is some water in the sota all the year ronad, but I have not seen it myself in the cold
- 9. Q. As to the Dhous schemes: what is your opinion as to the Dbous scheme?—There is no assured supply of water, because it is hunded in Nepal. Last year there were two bunds in Nopal. This year from September 20th to Octoher 20th the discharge was 2,000—350 cuses, but this year is an exceptional year; no one wants water. There are no gauges now; they have been all swept away. I was told to toke discharge observations only. toko disehargo observatioas oaly.
- 10. Q. That seems a fatal objection to this Dhous scheme?—I heard in the May before last that it has never been bunded except in the cold weather and thot thero was always a good supply of water. Last year it was bunded and there was no discharge at all.

- 11. Q. Have you had eccasion to look into this schome at all apart from the water-supply?—Yes, I was the one who drow up the scheme for it. The area commanded by the Dhous is 70 square miles.
- 12. Q. Is the Kamla a much more premising scheme, I believe?—There is a scheme drawn up, with plans and estimates prepared. The original scheme was to cost more than 201 laklis.
- 13. Q. And the river has warped for six miles?—Yes, the Balan has shifted over the country. But the second half of the schome, the western portion, I calculate to cost Rs. 10,41,000. There was not sufficient water to carry out the further scheme.
- 14. Q. It was not to obtain water from the Balan?-No; it was morely to be extended to the Balan.
- 15. Q. Have you got the discharges of the Kamla?
  —On the 6th of October it was 4,067 ensecs, on the
  13th it was 3,308 and on the 20th 2,015. It was an exceptional year.
- 16. Q. Is the scheme, as it now stands, a modified one?—I cut out the eastern portion. In other respects the scheme is exactly as it was.
- 17. Q. If the order were given, cau you communed the execution of the work at once?—No; it requires a good deal of revision; I only did it roughly. It is not in working order yet.
- 18. Q. Is the river pretty constant at the site proposed?—Judging from the old maps that we have got of 20 or 30 years ago it has not changed a bit on the frontier. But it has changed a great deal further down. The bed at Jynngar is very constant.
- 19. Q. Has there been any record of the discharge?
- 20 Q. Is the river dry towards the end of the cold weather?—It is constant in the cold weather. In May

there was two feet of water in the river, but I could Mr. A.H. C. see no flow.

21. Q. (Sir Thomas Higham.)—Are there any gauges kept on the Saran canals?—Yes; at head slui
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- 22. Q. How many years back do they run?—For 20 years, I suppose; since the canal was started. But they have not beca read when the canal has been 'closed. There is a hiatus.
- 'closed. There is a hiatus.

  23. Q. Do you know the discharge?—The maximum discharge was 150 cusees from the head gate. My experience is that if you give water to one slune you cannot always give it to the other, that is, in the hot weather, before the rains. The bunds were put in November last year; they went when the rains burst. During the last year we did not require any water; it was only later in the year when the river had gone down. We cut the entrance bund to let water down and it was that time we got 150 cusees.

  24. O Are those cannis onen just now?—Yes: but
- 24. Q. Are those cannls open just now?—Yes; but the river has fallen so low now that there is practically no water in the sola, and unless we put oross bands there will be no supply. One band costs Rs. 700; the others only Rs. 150. The Gandaki will be difficult, because you will have to put a by-wash in it.
- 25. Q. What is the total supply in the sota?—Not more than 250 cusees, I think.
- 26. Q. Is there any fear that the sota will change its course?—There is very great fear.
- 27. Q. Yey have a good many sluices in the embankment which have nover been opened?—A good many.
- 28. Q. What were they made for ?—I presume for irrigation. They are never used now. I suppose they were built before the canal was built. They are all the way down to Sonepore.

## WITHESS No. 39.-Mu. S. L. MADDOX, Collector of Durbhanga.

- 1. Q. (The President.)—How long have you been in this pince?—A your this time, and ton yours ugo I acted for three months. I was some time Sub-divisional Officer to the south of this district.
- 2. Q. (Mr. Muir-Mackensie)—Wore you here in the famine?—No.
- 3. Q. (The President.)—We are much obliged to you for the carefully prepared paper you have submitted. You say in "Bearpatti Thana the comparatively large area under irrigation is on account of the connections between the Kamla channels mude by Mr. R. S. King, Raj Sub-Manager. Some of these channels are also situated in Madhubani Thana." I notice in the statement in the front page that in the Benipatti Division there are 42,655 acres entered as the average irrigated area. Is thus area due to the notion of the Kamla channels made by Mr. King?—Not ontirely. There are small tanks and other small nullahs from which irrigation is nunde. This is the total from the settlement record for that thana.
- 4. Q. In rouly to question 4 you say "the cultiva-tion is not dependent on artifical irrigation here": in ordinary years, I presume?—The ordinary minfall is sufficient.
- 5. Q. You give a list of the sensons of famine and severe scarcity. It is a little difficult to draw the line between famine and severe scarcity. Have you any particular rule in your mind?—I call 1892 severe scarcity and amounting to famine Last year was scarcity, but not severe scarcity. 1895-96 would be severe scarcity, not amounting to famine. I was guided by the figures for relief more than anything clse and also by the Government of Bongal's letter. I have taken the terms used therein.
- 6. Q. The number relieved is not n very good eriterion, because the policy of the Government is not the same overy year?—That is so, especially in 1878-74.
- 7. Q. In 1896-97 the rice crop was only 31 per cont.?—Yos.
- 8. Q. In 1901-02 "the failure, having followed three years of good crops, did not cause famine." That is, prices did not go up very high?—And there was a very good rice crop in Nepal.
- 9. Q. In 1873 you say "Mr. Carlyle (on incorrecareas) calculates the yield of the crops," etc. ?—H had not the settlement records; that is all I mennt. ctc. ?-Ho
- 10. Q. I see he puts down a normal yield as 284 lakhs of maunds, and you work it out as 293 lakhs.

- The difference is not much?—No, but he had not the area as correct as we have, because the survey came in between.
- 11. Q. Do cultivators in this district attach the same importance to a supply of water during the halhia, the early part of October, as we have found to be the ease elsewhere?—They do.
- 12. Q. I suppose these figures are correct at the bottom of page 5; that there have been 76 laklis of rupees spent in 29 years?—My authority is the Government of Bengal's letter.
- 13. Q. Supposing satisfactory irrigation schomes were carried out in Northern Durbhauga, in how many years out of ten would the people take water?—At first they would not take water until they were driven to it; at first once in every five years, and after they have appreciated the bonifits of it they would take water oftener.
- 14. Q. If the Nopaleso allow water to come down only when nobody wants it, it is not worth while spending money on the Dhous scheme?—No.
- spending meney on the Phous scheme?—No.

  15. Q. On page 6 you say "it is stated in Mr. Macoacchy's note that originally the 'Kamla scheme, provided for an extension of the channel castwird to the Balan, but that new that the Balan has slufted its main channel?' miles eastward, the larger scheme could not be undortaken." Mr. Macoachy gives us another reason that thore is no water?—Yes, but I am not satisfied that Mr. Macoachy was correctly infromed that the Balan has actually slufted.

  16. O You say in the next paragraph that there is
- 16. Q. You say in the next paragraph that there is "a scheme for connecting the channels of the Bihul and Punchi and running distributaries southward over the northern portions of Allapore." You hope to produce the plans?—Yes. Kharag, not Panchi, is the correct name of the second river.
- 17. Q. It is a project that the engineers have not taken up nt all?—No; it was done when the Durbhangn Raj was in the Court of Wards, and I de not think it has been scrutinised by the Government engi-
- 18. Q. Have you reason to believe that it deserves scruting?—I have. I have rough plans here. [Explanation of plans.]
- 19. Q. The essential points seem to be: how much water we cau count upon in a year of scarcity. Nepal keeps the water-cock in her hands. Is that part of a district where there is severe want?—Yes; but not quite so severe as in the north-west parts. There is another channel too, since then, to cost Rs. 2,000

Mr. S. L. Maddox.

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Ben.

Maddox.

Mr. S. L. just north of the end of the Kamla channel, if carried Maddox: eestward to the Bolan, 25 miles.

- eestward to the Bolan, 25 miles.

  20. Q. Is that the kied of thing the Maharaja wends undertoke?—I think so, to give fomine relief.

  21. Q. You say that well irrigotion is not practised in this district?—That is so. In the south-west, bordering on Hajipar, they use wells for garden produce and in the north-west for opium and special crops they use o few wells, but the soil is not fit for wells in this district.
  - 22. Q. Another reoson might be that the whole of the country is under rice?—Yes; kochcha wells could not stand the floods. A pokka well would not be sufficient for the irrigation of rice.
  - 23. Q. In order to prepare the district for the possible edvent of another fomine, you strongly advocate the carrying out of these irrigotion schemes in the north, assuming that they are technically possible?—
  - 24. Q. And do you think that they would meet the situation? If the Collector had not got on his shoulders o very budgry population in the northern part of the district, you would pull through fomine ell right?—Yes, if a large section of the area were protected, we should pull through without relief works.
  - 25. Q. Do you keep a programme for relief works?

    -Yes.
  - 26. Q. Is that arranged under your direction by the District Engineer?—Yes; when I come in November I found a progremme ond medified it to suit the places where the crops had failed. It is priocipally of roads and tanks.
  - 27. Q. Tanks merely for drinking water for eattle, etc.?—Yes.
    - 28. Q. Excovated?-Yes.
  - 29. Q. Is there much room for the making of roads?
    —There is room for the improving of roads, but we do not want any more new roeds.
  - 30. Q. It is difficult to find work for famino relief. Then, supposing this Komla scheme passes scrutiny from the engineering point of view, would you keep it in reserve for future famines for relief, or would you earry it out at once for protection?—At once, to see how far it terres.
  - 31. Q. (Mr. Muir-Mackenzie.)—There is a considerable area under bhodoi rico?—Aus paddy wo call it.
  - 32. Q. Could the other kind of rice, aghani, be substituted if irrigation were introduced? It grows ot a different time, it is an early paddy?—I cannot
  - 33 Q. These tanks and roads apparently are not likely to be of much uso to you; could you substitute in your programme any works likely to be useful for irrigation?—Yes, I have got in my emended programme some local works, channels ond things which I here found out—things locally useful, for a small number of people. I here four or five for coch thans.
  - 34. Q. Would it not be possible to devise a programme of such works as would employ a large number of people, supposing you had a special officer going about the country investigating this metter?—Certainly.

  - 35. Q. What would be the nature of the work?—Poras entirely. A greet mony might be mode.

    36. Q. And nothing in the nature of irrigation tanks, or ahors?—I have no experience of them, but I fancy the floods would moke reservoir-making diffi-
  - cult.

    37. Q. When the famine was over you try to onconrage the digging of kochcha wells anywhere?—I was not here during the fomine. In my answer on page 2 to question 11 I say "the Commissioner in his No. 609-G. of 1896" (which must have been in the time of fomine) "ogrees with the Collector that rewards for making kachcha wells in this district are not odvisable owing to the nature of the soil."
  - 38. Q. But do you think that is the case?—It would he in the north of the district. They would be useful in the south, but the two southern thancs are not in our famine aree.
  - 39. Q. Would you expect the floods to speil your wells if you made them at the commencement of the famine? But would you got the water then?—No, I think not
  - 40. Q. With regard to the extension of well irrigotion, there appears to be some port of the district where the Opum Department find it worth while to moke wells. Do you not think n little more might be done by the Revenue Deportment on the some lines?—Yes, except in rice lends.

- 41. Q. In these parts is there any substantial proportion of lend which is not rice lend?—In the Kajauli Tbana where there is a substantial area of rabi inods.
- 42. Q. What is the immunity of the two soethers thanas due to?—To the difference of the soil and the voriety of the erops. They are not dependent on rice.
  - 43. Q. Not due to their irrigation ?-No.
- 44. Q. Were odvances given in the fomine to encourage the construction of pains onywhere?—I heliovo
- 45. Q. Do you onticipate that such odvances might usefully be made?—If one could know e little beforehend, but if there was no water, they would not be so ready to come forward to take advences for pains.
- ready to come ferward to take advances for pains.

  46. Q. Thorefore in famino time advances would be of no use. If advances were made in good years, would the people make pains?—In certain areas, yes. It would depend on the influence of the zamiodars?—Thet assuces that the odvances would be given geoerbily to the tenonts. Do not you think the zamiodars should be induced to make the pains?—The Mohorajo is a lorge zaminder and he would make poins.

  47. O. In answer to question 8 claves I was given.
- 47. Q. In answer to question 8, clouse I, you give the perceotoge of outturn. I believe 100 is supposed to be a rich crop?—A normal crop.
- 48. Q. Then in 10 years you have only got two crops of bhadei, two of agheni and one of rabi. Does not that indicate a tendency on the port of the people to under-estimate their crops? They never will acknowledge the normal crop?—Yes.
- 49. Q. Perhaps 75 or 80 might be a normal crop?
  -Yes.
- 50. Q. Moy we take it as probable that in this district you will not have enything like a famine unless you have two bed years ruoning?—The figures show that, because lest year we had a less total, 57 inches os against 58 in the famine year, and there was no femine lest year.
- 51. Q. Does the district feed itself in normal times? I should say so.
- 52. Q. Do you over think of laving any smoller irrigation works in the district that might be managed by the District Board?—I should like to heve such
- 53. Q. Would you like to see the District Board empowered controry to the present low?—Yes.
  54. Q. Would you prefer that the Board should manage it or the Collector?—The Collector is Cheirman of the District Board.
- 55. Q. Should he have the Board to act with or by himsolf?—There are some officers who entertain a very strong opinion that the Collector could do more if he were made independent of the Beerd. In Saran, however, the Board is particularly strong. There, some think, that the Board might help very much.
- 56. Q. A hundred thousand ocres ore olready irrigated by pains or other sources-private irrigation works other then wells?—Perbaps Mr. King's chonnels might holp very much.

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- 57. Q. Have you n srteng Board here ?—Yes; meny of these geatlemen present are members of our Board —Mr. Lloyd, Mr. King nod others.
- 58. Q. What class of work would you put under the Boord?—I bad intended to put the following works under the Board. [Quototion from supplementery statement.] In the course of my enquiries in eamp I preposed the following local works of ntility; but on good rain fell in March just when the conditions in the north-cost frontier (Phulparas) were becoming critical, so no estimates were prepored:—
- "], Durbhanga Thona. (1) Channel from the river Sikāru to the river Būrnad; thence into the nerthern villages of Jalley outpost.
  - (2) Chondehor tank in Paktola to be excevated ood chonnel to be dug out on the south-
  - (3) In Jogiana Bobaji's tank to be dag out and rood raised for four miles from the Chemortela to the Madhubeni roed; olse a tenk in the south of Jogiora.
  - (4) In Ratanpur three tonks to be dug out.
- "2. Bahera Thono. (1) A channel to be cut from the Komla river to Madhopar (north-west of Bahera).
  - (2) A tonk to be oxcavated on the west side of Pohardi villoge.

from the Balan river at Parsahi to Kalpati through Maharajpur, Siswar, Dhanjera and Kallapatti. Levels have been taken and estimates for Rs. 10,000 have been drawn out. The Maharaja will probably undertake this work.

(3) Further north near the frontier, a channel to connect the Bihul and Pancha hill

"4. Khajauli Thana. (1) A channel to be cut from the Kamle river at Marhia Chât and to be brought southward through the affected villages.

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ati Thana. (1) Mr. Christian's channel bringing water senthward. . . "5, Benipati Thana.

(3) A channel to be deepened and dug cut from the Jamoi river to Kowaha."

50. Q. If you utilise the period of good years to have a thorough investigation of the country, yen would get well considered schemes in a considerable number of ploces?—Yes.

60. Q. You have considerable experience as a Settlement Officer?—Yes. I was in Orissa sevon years on settlement work.

61. Q. You have never framed anything like records in water?—No.

62. Q. De you think it might be useful in places where there is a considerable amount of complication in the rights to the water; for instance, on rivers where disputes arise as to the right to erect bunds and pains, where disputes are likely to arise os to time in which the water is to be used? Would not it be voluable to cuter these things?-Yes, most valuable.

C3. Q. And would you advocate the Collector having of the facts recorded in the record-of-rights? At present they have to go to the Civil Courts?—Yes, and with a large extent of bitterness.

64. Q. (Mr. Rajaratua Mudaliar.)—Are there many pains in this zamiudari?—Net many.

65. Q. A hundred thousand acres are already irrigated by pains or other sources—private irrigation works other than wells?—Perhaps Mr. King's channels might account for 80 per ceut. of that.

66. Q. Is there scope for the construction of mero pains?—Yes.

67. Q. Is the Durbhanga State prepared to carry them out?—I think the Maharaja would de so if he were assured that pains were for the benefit of the

63. Q. I suppose they have not been investigated?—Mr. King is doing a good deal in the north of the district, and I believe he has plans for the eastern Kamla sluices.

69. Q. (Mr. Muir-Machenzie.)—II are yen had much experience in takavi advances?—No.

70. Q. During this last year have you granted many?
—A few; about Rs. 1,600.

71. Q. That is a very small sum for a large district?
-Yes.

72. Q. What are the reasons; why you are unable to get rid of any mero?—The rayats apply so very late. If they would apply earlier, we could give them advances. They apply when the season has gone.

73. Q. Thore were a good many applications that were not complied with —No; generally the applications are complied with when they are put in. They go on in their distress until advances for seeds, etc., are useless and then apply; that is, very few apply.

74. Q. How long would it take you to go through the enquiry before you grant the application?—A long

75. Q. Do not you think that that time ought to be shortened?—Yes.

76. Q. What method would you propose?—Let one Deputy Collector devote his time to the purpose.

77. Q. Would you put a man on that and nething else?—We could not spare him.

78. Q. If you were given additional mon?—Yes. 79. Q. Would there be enough work for him to do? Not always; only perhaps at certain times.

80. Q. Would that only arise in n big famine—No; in severe scarcity and scarcity.

81. O. In scarcity would you like to apply to your Local Government to give you a special man?—Yes.

82. Q. Would you send him out with mency in his pecket?—I should like to de that:

83. Q. With machinery of that sort how long do you think it would take to dispose of the applications?—
We could dispose of thom within a week. I see no reason why we could not do this. It would depend on the number put in a week.

84. Q. How many Sub-divisional Officers have you? I liave two-one at Samastipur and one at Madhu-

85. Q. Are they empowered to grant taken leans?—They are empowered to make enquiries. They don't actually grant the leans; they recommend to me.

86. Q. Are they empowered to receive applications—I think so. I am not certain. Mr. Watson is here and he would be able to tell you.

87. Q. De you think it would be a good thing, if, as a matter of course, all Sub-divisional Officers were empowered?—Certainly.

88. Q. Do you apply every year for a certain alletmont for advances?—Yes. In fact last January I applied for an extra alletmont, but I could not spend it before March. I have plenty for this year.

89. Q. Hew much?—I cannot tell you. I will find out and let you knew to-morrow.

90. Q. It is nothing like a lakh of rupees ?-Ne.

91. Q. Rs. 10,000?-I think we have Rs. 5,000 fer this year.

92. Q. (Mr. Allen.)—We only get four lakhs for the whole province.

93. Q (Mr. Rajaratna Mudaliar.)—I suppose zamindars would be disposed to grant leans?—Yes. Zamindars de grant leans; the Moharaja grants leans.

91. Q. What rate of interest is charged?—I don't knew; I have no idea at all.

95. Q. (Mr. Muir-Mackenzie.)—Are the leans under the Lands Improvements Act or the Agricultural Leans Act ?—Our applications generally are under the Agricul-tural Leans Act and not under the Lands Improvements

96. Q. (Mr. Rajaratna Mudaliar.)—The Agricultural loans is chiefly for opium?—That is different. They give such advances independently of the Collec-

97. Q. (Mr. Allen.)—What were the fleeds due to this year,—all the streams?—The first fleed which broke in the frentier on the 12th came down in the Janani, Kamla and the Balan, and it was due, it is said, to 20 inches of rain in Nepal—not to any local rainfall.

98. Q. After that was the flooding of the streams general, or coulined to any particular streams?—General in the first flood.

99. Q. Durbhanga is the biggest rice-growing district in Bihar?—I have not seen the figures.

100. Q. There is a very large quantity of rice imperted from Durbhanga?—Yes.

101. Q. Especially from Saran?-That I den't knew.

192. Q. In connection with this question about Dis-192. Q. In connection with this question about District Boards taking up irrigation, if the law were amended, would the District Board have any funds to meet the deficit from irrigation schemes? Would you have enough money for roads and have a surplus in the District Fund?—This year we have, because we put away Rs. 71,000 to be spent on famine and there was no tamine.

103. Q. In ordinary years would you, as a rule, have a surplus?—We have. My opinion is that the District Engineers de not spend all the money alletted to them every year, and that in fact there are savings every year. I think I could prove that from the figures. the figures.

104. Q.—It is the general experience that District Boards have not sufficient funds to carry on their own ordinary work?—This (Durbhanga) is a very much richer District Board than most.

105. Q. (The President.)—Where do the District Beard get their funds?—From road cess.

106. Q. (Mr. Allen).—Has any scheme been put ferward in this district by the District Engineer for feeding tanks by pains from rivers?—Yes.

107. Q. Can yen give us seme opinion about that?— Here is a report which Mr. Barton sent to me, and Mr. Barton is on leave. I only found it yesterday.

103. Q. It was a scheme, I understand, for feedig tanks by pains?—For feeding tanks some existing and others had to be made from the snow-fed rivers.

109. Q. If such a scheme were practicable, de you think it would be useful for irrigation purposes?—
I think it would be very useful, but I don't think it

Mr. S. L. Maddox.

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would be practicable, because there would be such difficulty in maintaining these channels, when they were made, even if you declared them to be under the Embankment Act, and there would be a series of vexntious cases. The rayats would not preserve them.

- 110. Q. (Mr. Mnir-Mackenzie.)—You would have te have some power in the hands of the Collector to obligo these channels to be kept in a state of repair?—Xes, you should have to nequire the lands for the channels first.
- 111. Q. Is there ne hope of the people giving the lands for these channels which would be useful for irrigation?—I think Mr. King could do it, or one of the Maharaja's managers could do it, but I den't think the ordinary zamindars have any give or toke to help each other.
- 112. Q. (Mr. ARen.)—Mr. Mackenzio asked you a question about the record of rights of streams. Do you agree there is nothing in the present Bengal Tenancy Act to prevent your making such a record-of-rights?—The law permits it. I know nothing against it.
- agninst it.

  113. Q. (The President.)—You have got here a very large zamindari and a number of small proprietors in different places. Are there may particulars on which you cannot get information as regards a large zamindari which you do get about small ones? This recoson I ask you this is because there are very large important zamindaris in Madras, and for the purposes of our ougnities we found that there was an absolute want of information which apparently was extremely difficult to get. Do you find any difficulty as regards that?—No. Any information I have asked for from the Muharaja has also done so himself.

  114. O. (Mr. Recording Mudalar.)—What is your
- 114. Q. (Mr Razaraina Mudaliar.)—What is your guarantee that the figures are correct?—We have got European managers.
- 115. Q. You have got your settlement records and your revenue records Are they the same? Are they as full of details for small as for large zamindaris?—Xes.
- 116. Q. (Mr. Muir-Mackenzic.)—Until you compiled your actilement records you were without a great doub

- of information which you now have?—Yos, I could not have given you these figures.

  117. Q. (Mr. Rajaratna Mudaliar.)—Under the bhaoli system what occounts do you keep?—I think Mr. Lloyd would be able to give you the information. He could show you the bhaoli accounts.
- 118. Q. (Sir Thomas Higham.)—There is no extensive programme of tank excavation here; is there not?

  —Yes.
- 119. Q. You have made very large tanks, I think all over the district?—Yes.
- 120. Q. Have they been of any bonoft? I den't think I can say. Some drigotion are done from thom last year. I don't think they were made originally for the nurpose of irrigation. Mr. King would be able to toll you in regard to the tanks made last year in the famine.
- 121. Q. Are they filled with water?—They have filled this year probably. They went very low last
- 122. Q. You cannot say whether these tunks have been any particular good?—I find that the sites wore not acquired, so that the tanks in many cases have gone back to the zamindars. Now these tonks Government excavated are becoming the property of the zantindars.
- 123. Q. Do the ramindars nade uny use of them?—I suppose the rayats use them for irrigation, watering their cattle and drinking purposes.
- 121. Q. You cannot say whether they do or not?\_\_\_ I should say they do.
- 125. Q. I suppose there is plenty of water for cattle nt any timof—Except in a case like last year, when the rains ceased early; last year the water-supply was very short indeed.
- 126. Q. It is said that these tanks would be very valuable for the fish they have in them. Do they have any fish in them?—I don't know, Sir. Mr. Onraet could tell us, I think.
- [Addressing Mr. Rajnrutnn Mudaliar, witness said :
   You asked me low much was irrigated from tanks
  here; 45,000 aeres are returned as irrigated from
  tanks.]

WITNESS No. 40 -Ma R. S, King, Manager, Durbhanga Raj.

Note on Irrigation, Rokika Circle.

Mr. R. S. King.

- 1. In famine of 1897, hesides Rs. 50,0% spent in ro-1. In faming of 1817, besides is, 60,000 perts in resecretaring tanks in this circle, Rs. 10,000 were expended
  in some 5-mile channels and temparary dams to lead
  water from the present Kainla bed into the ald bods being
  east (which act as distributories having pains leading from
  them to the adjacent rice land). In this way some
  25,000 bighas of rice crops were saved and rabi crops irrigated then
- 2. The above channels and 13 miles more made in May 1901, noted an every fre-het during the scanty rains of 1901 (the Kamla comes direct from Nepal valley and hence freshets frequently poss down without any local min here owing to roin having fallen there or in the lawer hills. In this way the full rive and rabi crops of sone 40,000 bighas were secured in 42 villages.
- 3. After the cessation of the rains about the first week in November 1901, as soon as the water passing down the Kamla had become fairly regular in volume a temporary mbankment and weir was started at Narkattia, Il miles north of Madhubani, and 41 miles of channels, 15 feet wide, deepen of 13 feet to lead water east to the Jitatch river, along which the rice crops had oftenly failed the rains never having been sufficient to make this stream flow. Owing to freshets in the Kanala this embankment at Narkattia was three times washed away during construction and the water could not be turned down the main channel till 12th December 1001, when it first began to flow steadily. This embank-ment was maintained up to 81b Mny 1902, when the first heavy freshet swept it nway.
- 4. After filling the Jibatch river-bed from Rarhmalmal to Malaugia (about 12 miles) and flooding from it the

- fields alongside by various temporary dams along its cour o cuttings were unde eastward from it at Keenia, 6 miles north at Madhebani, leading the water into old leds, and the water begen to flow along these on 6th February 1903, thus giving water to many villages which were in a very distressed state for want of it for cattle. Madhulani town of 18,000 inhabilitate was also given a fresh supply of water when distressed for want of it and chelera rife. Rs. 4,000 were spent on this work. were spent on this work.
- 5. The whole flow of water in the Kamla was directed down these channels.

C.

- I have never seen the Kamla se low before during my 13 years' experience of it. At one time (m A ril) the total flaw was only sufficient to fill u channel, 20' wide and 20' deep, with a fall of 2 feet rer mile, and there was practically no waste through the weir. (Puring the famine of 1897 we could never close the waste weit completely, as the flow was at lowest senson always double the amount required to fill a channel, 20 feet wide and 21 feet deep, with a fall of 3 feet per mile.)
- A tabular statement is onnexed showing the areas

	Bighas.
Full crops scented for 1309 F	40,000
Robi crop irrigated and tanks filled . Tunks filled, eattle sopplied and seed-	5,000
lings secured for 1310 F.	15,000
	60,000

- 1. Q. (The President.)—You are one of the managers of this Raj. I am sub-manager of this Raj.
- 2. Q. How long bare you been in it ?-Thirteen years.
- 3. Q. You have n very intimate acquaintance with the reople here and have seen them through these years of famine !- Yes.
- 4. Q. You have managed to frame some relief works
- 5. Q. We have read with great interest what you have not on the Kamla. Have you n map here?—There is a dnos ou the Kamla. map here which I think would give it at a glance. This is it (hands it in). It is on un inch to the mile scale, and as

regards the different Sections A, B and C, A is the portion in which the crops have been scenred during the last season, B represents the portion in which the rabi crop was irrigated and C are the villages which the water reached in gaven and U are the valleys which the maker reached in February, March and April for Illing the tanks, watering the enth and giving water to seedlines for the current year. (Explained on map.) This bund (indicates Narkattia) was begun in Navember and was finished on the 12th of December. It burst three times before it was finally finished. The bund cost about its. 1,000 for making and mainta uing for six months. There were continual ire-lets coming down the river and I ran the water into the old b-ds of the Kamla and irrigated all these crops (shown on map). It was not raised high enough to take it down this channel (Indicates) until we made an embankment.

- 6. Q. Is this (points to it) all rice land ?-Roughly ? of it is.
- 7. Q. Did they get their hathia water?--No; with irriganien water this crop was pulled through; on an average they got 12 or 14 aniso of it.
- 8. Q. You can claim all this yellow (en map) as crops secured and all this green (on map) as comps aved by your bunds or channels?—Yes. It was not in time for the rowbunds or channels?—Yes. It was not in time for the rowing of the rabi. The rabi which was sown was secured, but it was not a full rabi crop. The rabi was sown in Ootober and the water began to come down here in Decemher. The water was running down this Areth channel. The bhudoi and rice and rubi were all secored.
- 9. Q. Suppose none of these channels were made, would all these crops have been lost?—No. I don't think so. In parts you would have not half; on the west you would have had a fonr-anna or six anna crop, I think. There would have been scaroity, but I don't think there would have been famine exactly.
- 10 Q. How many bighas or seres do you consider that on irrigated by these means full is shown in brief hero (man) d1,000 across of yellow; that is the crop sconred, 5,000 of rabi irrigated after it had been sown and 15,000 bighas of these villages (shows on man) which had water given to them in their tanks for their oattle and for their soedlings.
- 11. Q. Then 45,000 bighas were really irrigated !- Yes. (At this stage Mr. Maddox put in some stations showing that the outturn of crops on Mr. Klag's channels was 85 per cent, of the normal, while that on the west of this irrigated area averaged 31 per cent, on the east 22 per cent, and on the south 19 per cent.)
  - 12, Q. Se this irrigation quite doubled the value of the onttnrur-More than that. It would be multiplied by four.
  - 13. Q. And the cutlay altogether was how much?—Including the channel made in 1897 it was between Rs. 13,000 and Rs. 14,000.
  - 14. Q. Did you first make these channels in 1897 ?made this channel (indicates on map Narkattia) in 1897 and also this one here (indicates on map Arcrh). I spent Rs. 10,000 in 1897 and Rs. 4,000 last year.
  - 15. Q. It was a very successful onterprise, I think ?—It was only dono bit by bit from practical experience of how the water had been flowing for years with the help of the
  - 16. Q. Now how often did the people want it botween 1887—1:00? Did you use them at all in 1898 and in 1901:—No. They did not require it thou, though, as a matter of fact, this Narkattia channel remained open, because the maliks would not allow it to be closed at the top, but it did irrigate with benefit and gave faller crops.
  - 17. Q. Why would you have closed it ?—I would have closed it because I did not think there was any necessity for it, and it would have prorected it from silting. I thought it was needless to keep it open. I did make a bund, but the maliks would not allow it to he closed.
  - 18. Q. Then the bund was not within the Maharaja'a dominiou?—No. It belongs to a petty malik.
  - 19. Q. Now what would you like to do to ensure and improve this irrigation which you have started there? Would you like to put a hig weir across the Kawla at that place?—I should be afraid of the Kawla leaving the weir.
  - 20. Q. Where is the place where the Kamla Canal is expected to come out?—Near Januagar further up here (indicates on the map). About a mile from the frontier I think. I am not quito certain.
  - 21. Q. In fact the Kamlo irrigation would not be in your tract at all? It would be away to the east?—Yes.

- 22. Q. If that canal were made, your area would be cut Mr. R. S. off from irrigation. In a year of drought your supply would be completely cut off ?—Yes. It would be merely transferring irrigation from one place to another year in April the water was not sofficient in the Kamla river to fill my channels fully.
- 23. Q. In April do you want water for your robi?—If the water was given in October, it would not be wanted in April. In fact the rabi in this part of the country does not require any water if there is a full rainfall at the end of the year in October.
- 24 Q. If the Kamla scheme is carried ont, it means crippling your work? —I thunk, if this Kauda scheme were carried ant, the orays protected by it would be seen red lung before the river would dry up. There would be ample water for everything in October. They would not require water for everything in October. They would not require water in February and March at all if the crops were secured in October, and there is always ample water then.
- 25. Q. The Kamla project is for 600 , ubic feet a second? -1 don't remember.
- 26. Q. That would not be enough for all the lands to be irrigated?—The waste water in October would do for me. I do not apprehend that the Kaula scheme will take away my water. The crops coold be secured by good water before October.
- 27 Q. What about a dry year?—There are freshets coming down when there is no local rain, and I believe there would be ample water for giving all this here (map) a good erms of rice and the waste water would be sufficient for these channels
- 28. Q. (Sir Thomas Higham.)—You would be able to make your bund so much earlier?—Yes
- 29. Q. (The President.) I am chiefly thinking af a year of drought?—The river generally rises sufficiently in the previous rains to give ample water for secoring these crops before the rud of October.
- 30. Q. October is the crucial month; is it not P-Yes. If we get good water in October, it will secure all the rice which has beer planted. In years of the greatest drought such as 1897 and 1902 from \$ to \$ of the rice area has remained unplanted ewing to insufficient rain in August and September. That is plenty and gives moisture for the rabi. They don't want water after the rabi is sown.
- 31. Q. I must say I cannot see how in a year like 1901-1902 yan could irrigate, say, 40,000 bighas, and yet have this Kamla schome in full swing?—The volume of water that comes down the Kamla op till the end of October is sufficient for irrigating the whole district.
- 32. Q. Our evidence is that the supply is only 600 cubic feet a second. We are told that 600 cubic teet a second is all that we can coant upon in October. Forty thousand bighas will use up all that P - At the end of October the minimum would be (01) cubic feet and this work any be done before the 15th of October. I think the ovidance shows that the river falls very anddouly.
- 33. Q. A year of extreme drought is what I am thinking of P—I have got a record of the rainfall here for 25 years, and in all the years the river has been full. Freshets have been coming down constantly every fortnight or so up to middle of October, setting these obannels going fully and giving full irrigation.
- B4 Q. You have done so much at so little cost here that I am doubtful whether it is worth while spending ten lakhs on the Kamla scheme?—My scheme is only for one local nrea. I think a system of pains (i.e., channels) north and south would be very useful.
- 35. Q. You know all about the Dhaus scheme ?-Yes, I have read about it. I have known the Dhaus for 16
- 36. Q. Considering the hold that the Nopal people have on the upper water of that river, is it in your opinion worth spending much money upon it?—I don't think so.
- 37. Q. Would you reject it altogether? I am not qualified to say that. The river has been hunded not only in Nepal, but also on this side of the frontier in British India. It has been bunded off and on for the last 15 or 16 years. I only say that I do not think it is worth spending much money upon, because the water-supply from that river is not much, otherwise they would not have been able to
- 38 Q. (Sir Thomas Higham.)—In making this bund on the Kamla I suppose you employed famine labour?—I had about 500 men working ou it.
  - 39. Q. Whore did you get them from P-Legally.

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- 40. CD Did all the villages interested in it seed up men to help P—Yes, but the volunteers ware of very little use. They generally arrived whout 12 or 1 o'clock and went awey at 4 and they asked for some food to eat in the middle of the day.
- 41. Q. What did you do ?-I had to do it by contract work, except of course what was done departmentally.
- 42. Q. What was done departmentally?—What they call locally goors, made with hales of grass and olay wrapped together—the only thing that could be used for a bund. In this sandy river all that was done departmentally by dully labour we could not do it by contract work, because we could not get anyone to take it up.
- 43. Q. You did not get anything like a lavy from your villages ?—No; we had no corece. We simply asked for volunteers who did very little hot look on. If I had depended on the volunteers, the bund instead of hursting three times would have burst a dozen times or more.
- 44. Q. For how many years have you made this bund?—The bund was made for the first time in 1897 and it was made again last year, 1901.
- 45. Q. You have not made one every year ?-No; it is not required.
- 46 Q. You have only done it twice?—Yes. Before 1897 the natives said this river could not he bunded, or at any rate they had not socceeded in delog it.
- 47. Q. Which was the easiest, in 1897 or 1901?—Io 1901. I think. I had the experience of 1897 then to belp mo.
- 48. Q. This bund took you four or five weeks ?—Yes. It was about 550 feet or 600 feet long.
- 49. Q. Do yoo know anything about the floods? Do they have very big floods in the Kamle?—Yes. It is impossible to understand what floods these are without coeing them. The whole cooutry is simply ous sheet of water.
- 50. Q. Is there any spill above in Nepal ?-I soppose it does food there equally, but I have not been up to see.
- 51. Q. Any conal that came up here (indicates on the map) would be lishle to be ewept away?—Of course this year it was no abnormally destrictive flood, but I have not got enough professional knowledge to say that.
- 52. Q. You say the whols country is flooded? Yes, to my knowledge it spills from the frontier down to Mohanpur Ghat.
- 53. Q. An far as Nepal is concerned comething might be done here to shut off the spills?—Wo cannot shut off any spill in Nopal whatever wo do here. I om not aware what the depth of the spill in here. Jainagar is a high land, and I think the spill is chiefly to the west of Jainagar.
- 64. Q. What happens when a big flood comes down?— This channel (indicates on the map) I had protected with a very high bank at the mooth with spurs after the drought so that the flood did not pass down it save what flowed to from the sides when the country flooded.
- 55. Q All the schemes that have been put before no are all worked out on the supposition that so a sine qua non water would be given to the rice in the first 15 days of October, what they call the hothic?—Yes.
- 56. Q. What do you call the hathia here?—It varies in the different years. Generally it is the first fortuight in October.
- 67. Q. During that, part of the time you have got freshets and part of the time you have got no water ?—Yee.
- 58. Q. In 1901, if yoo had oo freshets during that partioular fortnight, what would have happened?—It would have been probably an 8-anna crop iostead of 14-aooa crop.
- 59. Q. I suppose it had got water before the hathia?—Ample water.
- 60. Q. If, instead of water being given to the rice orop in the hothio, it is given up to the 15th of November?—I should say it would secure it from drying up and being a failure. It need not be given in the first forteight of October. It may be given up to thefirst week in November. It would then save the crops. I know that from my experience of 1897.
- 61. Q. (The President.)—Do the people here consider it necessary to rou the water off their fields in September?—When they have a normal ruley season they begin rouning off the water io September; they do not do so in dry years.

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62. Q. We were told that on the Sone canals they looked upon it as essential to run off the whole of the water in Sep-

- tember, and that then they must have this hathia water at the beginning of October?—I think that it they could depend on getting a supply in the hathia, they would run it off a great deal more than they do
- 63. Q. (Mr. Muir-Mockenzie.)—According to Mr. Maddox, in order to get a real famine to the district, it requires two successive years of failors. Would you say that?—Yes. Well, I should modify that, because we had not two years of failure in 1897; then there was only one year of real failors.
- 64. Q. Mr. Maddox in his paper points out that the rice erop in 1836-97 was worth only 31 per cent. and only 69 per cont. in the year before. The necessity for the large relief measures was occasioned by their having had a short crop a year before?—I should think it was very much accontuated by their having a poor crop: the year before; but we would have required measures of collect probably for } or \$ of the actual area even if there had been a full crop the year previous.
- 65. Q. With regard to these channels that you have made how do you hops to get them maintained?—I had not settled any orrangement for that. I naked the rayats who had get full crops to give me half an anna per bigha for the maintenance of the chancels, and they have done so after a good deal of delay, and I hold come of the moosy in hand now for clearing the silt from the channels. Altogether Rs. 1,800 was paid for the purpose.
- 66. Q. Yoo have us power of calling on them for labour?
- 67. Q. It depended entirely on their being willing to give the money F.—Yes, it was quite optionol. The money was only towards the maintenance of the channels, and I proposed it only as a tentative measure. I had enough trouble in doing it, and I do not feel inclined to do it ognin. There were too moch trouble about it for the return.
- 68. Q. Are they not enough alive to their own interests to help you as regards this ?—Once they have seemed a good crop they do not care a bit, though whils they want water they promise you anything.
- 69. Q. Yoo sald you were able to carry this echsmo of youre through from your intimate knowledge of the country. Do yoo thick yoo might find a good muny other places where the same thing might be done if you had time of examining the country ?—It woold only he after living in the country for some years and going round it that you could do anything. I don't think it would be possible by a simple examination.
- 70. Q. I meen by a professional man?—A person knowing the levels and who had a contour map might do great deal in this way.
- 71. Q. Was there much bhadoi rice in that irrigated area?—No.
  - 72. Q. It was always an aghoni area?-Yes.
- 73. Q. Can you tell me from yoor koowledge of the country whother the increase of means of irrigation is likely to resolt in the substitution of 'aghoni for bhadoi?—I think that the urea of aghuni has increased in this irrigated area eince irrigation has been introduced.
- 74. Q. These works of yours consisted practically, did they not, in the re-opening of silted channels?—My work consisted chiefly ic cutting across the silted areas into the old channels heyond the margin of cilt from the new channel.
- 75. Q. The disneed channels were owing to silting caused by floods P—Yea; my experience of the Kamla is that it throws eilt for about 1½ miles.
- 76. Q. Have you any cases where the obannels become disured owing to the erection of embankment to prevent floods?—No.
- 77. Q. Do you do anything in the way of well irrigation?—In one village only. It is a large opium growing village.
- 78. Q. And the other villages are they unsuited to it?

  —There is un demand for it. The kookeka wells fall in almost at once.
- 79. Q. In this opium village are the welle all kachcha?

  —No, they are pakka. I have given them monoy to make them. It is a village of very high level and does not get water from flooding at all.
- 80. Q. And in there villages, which are of low level, do you think nothing useful could be dood from wells !—I don't think so.

- 81. Q. Not even if wells were made for the growth of the valuable garden crops?—Very little of such garden crops is grown in this area. There is very little tobecco or such crops grown there.
  - S2. Q. On what terms do you give your advances for wells?—We have given the mousy for wells simply as a present to them.
  - 83. Q. You get no return?—They poy their rente regularly and they ore good rayats. It was given as a matter of benevolence from the Maharaja.
  - 84. Q. You got no increased rent?—We got n full rent for the opinm londs, but it is not a specially high rent.
- · 85. Q. It is not enhanced?—In no way on account of wells.
  - 86. Q. (Mr. Rajaratna Muddliar.)—On the louds irrigated by the channels you constructed in 1897, do you not levy any water-rate or any enhanced reat ?—No.
  - 87. Q. These 45,000 bighas are irrigored free, without any charge ?--Yes.
  - 88. Q. You have power to enhance the rent. Could you not have levied on extra charge?—I could have, but we did not ook for it. All we ask for is regular payment of the rents. The Muhamja has been very generous to the raysts in such motters and we have dug tanks and made wells in that way.
  - . Sy. Q. You don't endeavour to recoup yourself, or obtoin of least the interest on the outlay f—No. Within the last year. I have refused in some cases to make embankments, because I found the rayots took no eare of them once they were mode, and relied on us to make good many damages. So now I lend them money to make embankments; when they themselves make the embankments they take greater cure of them, I find.
  - 90. Q. Do you chorgo any interest on these loons ?—At 12 or 12½ per cent., which is two amas on the rupec. The rayats understand it as a simple way of calculating. We lent them money in 1897 at 4 per cent. and found they did not want to repay it, because it was ut such low rates. They paid their makajaus some of this money and then osked for more money, because they could get it cheap, and I have recommended to the Maharaja not to lend money at less than 12½ per cent.
- 91. Q. (The President.)—In that about the bania's rate?—The bania's rote is 25 per cent.
  - 92. Q. (Mr. Rajaratna Mudaliar.)—On the land irricated by your channel in 1897 you would have lost the rent hut for the channels?—We could not have collected it io 1897-98. It would have had to have occu postponed.
  - 98. Q. I suppose you would not have succeeded in getting it all?—Probably we would have lost one-fourth of it.
  - 94. Q. What was the cost of the chonnels?—In 1897 there was un expenditure of Rs. 10,000, including an embonkment. The embonkment cost Rs. 2,000 and the channels Rs. 8,000.
  - . 95. Q. You said that awing to the obstruction of a malik you were anable to extend your channels !—I was unable to close it. It was not the malik in whose lond the channel was on, but on adjoining malik. He would not allow a spur to be unade ut the end of the embankment; hence the water swept round it and ent it uway.
  - 96. Q. In the case of these chunnels did you find any difficulty owing to the want of provision in the low for

- acquiring land in carrying out snob work?—Through personal nequalitance with the locality, the raysts and the adjoining petty maliks, I find no difficulty. They have such confidence in us that they give us the londs. I have generally been able to persuade them.
- 97. Q. Do you think it would be an advantage to amend the low, so that, if there was a refructory tenent, you could compel him to give up the lond?—We have not any question with the tenants, but only with the adjoining matiks. If we have to carry a distributary through some tenant's land, they generally give the land up willingly and we take it off the rent roll.
- 98. Q. (Mr. Muir-Mackenzie.)—Do you think Government would meet with no more difficulty than you do?—I don't think ec. I think the people would have more confidence in Government, and that the Collector could persuade them to give up the land.
- 99. Q. (Mr. Rajaratna Mudaliar.)—You have given some odvances to tenants to make wells. In these cases also do you give them free of any increased rent?—Yes.
- 100. Q. (Mr. Allen.)—You spoke jost now of Government heing able to do this kind of work. Would not the tenonts, os a matter of foet, want Government to pay much more than you pay?—They would undoubtedly do their best to got every pice they could out of Government.
- 101. Q. Do you think ony Government officer would be able to carry out a scheme of this kind in the way you have done it? Is not this u case of your own personal influence?—I think it would require a man of experience and a great deal of opplication and time. You would need to have a special man for that one work ulder.
- 102. Q. Yon have not onything like o water-rote here?—No. It was only levied once last year as a tentative measure, and I found so much difficulty und bother that I have decided not to have anything to do with it again.
  - 103. Q. You don't levy any water-rate ?-No.
- 104. Q. Whot is your opinion about that? Do you think the people would pay, say, Rs. 2 m acro for water in a dry year?—In u dry year they would pay Rs. 2 to not their rice crops in when they sow there was no chance of gotting it in through the mins. At the last pluch they might do it, but they would not do it universally. Possibly 50 or 60 per cent. would do it, but I don't think they would pay unless put to the very last pinch about it.
- 105. Q. What is the rate of rents about that part?—About Rs. 4 per bigha.
- 106. Q. So timt, if lovied, the water-rate would represent about 50 per eact, on the rent?-Yes.
- 107. Q. Would there be any chance of people paying that every year?—No chance at all.
- 108. Q. The enormous benefit you have coused to this country would only be felt in years of drought; you would only require it cook in four or five years?—Yes.
- 109. Q. Is it not a permonent benefit?—It is a permanent benefit in opening up these river-beds, for since the chonnels were made in 1897 these villeges (indicates on map) have had foller crops than the edjoining villages. It means a difference of \(\frac{1}{2}\) to \(\frac{1}{2}\) in the crops.
  - 110. Q. Evon in a year of good rainfull?-Yes.
- 111. Q. In a year of good rain you close these channels?
  —I close these running down here, Karh Molimit (mop);
  this one (map), Arch, I beve left open. It is a 16 feet
  channel.

WITHESS No. 41 .- BABU GHUBAN SINGH, Collectorate Sherishtadar and Rayat of Jogyara.

- 1. Q. (The President.)—You are a resident of this district, I understand?—Yes.
- 2. Q. Do you know the agriculture of the district; you have enlitedted land of your own?—Yes.
- 3. Q. Do you think the country requires artificial irrigation introduced into it ?-Yes, it does.
  - 4. Q. In what paris?—The northern paris especially.
  - 5. Q. It would not require it every year ?-No.
- 6. Q. About how often?-Every third or fourth year regularly.
- 7. Q. Would the onlivating closes be willing to pay for it?—I don't think so; the well-to-de persons would be able to pay, not the poor.
- 8. Q But they would guin something by, it?-In that cose they would pay.
- 9. Q. If u man gets water he will gat a better return; is it not reasonable that he should pay something !—Yes.
  - 10. Q. They pay a road cess in this district?—Yes.
- 11. Q. Every year?—The rayets pay the maliks and the maliks pay Government.
- 12. Q. Would they be willing to accept on irrigation cars of about a quarter anna on the rupeo?—They may.
  - 18. Q. Every your?-Yes.
- 16. Q. Or would they profer paying a larger water-rate when they use the water !—No; an irrigation cess would be much better.

Babu Ghuran Singh.

30 Oot. 02.

Babu Ghuran Singh.

- 15.4. Have you seen the country near the Kamla river which Mr. King has irrigated by these cuts?-No.
- 16. Q. Do you know the country on the Dhaus !- No.
- 17. Q Is there much irrigation done by pains from the rivers in this district?—Yes. 30 Oct. 02.
  - 18. Q. Have these led to many dispates?—Yes; come-times one rayat does not allow the water to go into the landa of another rayat.
  - 19. Q. Do they go into Civil Coarts?-Yes, and also to the Criminal Courts
  - 20. Q. Do you think it would be a good thing if the Collector had power to deal with these eases ?—Yes; it would be much better.
- 21. Q. Is there any mency spent in keeping these pains -No. When there is a dry season they are dag, and when the season is over and the lands irrigated they all fill ap; these pains are worthless; the big pains excavated by the Maharaja are somewhat useful and lasting.
- 22. Q. I see a great many tanks in this district; are they ared for irrigation at all?-Yes; sometimes the malike don't allow it.
- 23. Q Are they kept for watering cattle?—Yes; when there is scarcity of water the malike etop other rayats from asing the water oven for cattle.

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WITNESSES Nos. 42, 43 and 41. - Mr. S. Rout, Ma. Gond Churk Singh and Mr. Premasware Rout, Cultivaters

Mr. S.

Rout,
Mr. Guru

Archive Group. List year the rainful here was scanty and the cultivation suffered vory much. Rice is Mr. Guru

Charn Singh If a canal was unde we would take water. The Nepalese hand the water are we would make our or the Nepalese. and Mr. band the water, or we would make our nwa canals. We Permassari cometimes pay the Nepalese to out their bunds. Mr. Wilsoo, Rond. Manager of the Charant Mahans, has mada a canal from which we get great benefit. We pay the Nappless Rs. 5 or Re. 10 to open their bunds. If Government makes a canal, we would pay when we took water, but the people would not like a permanent cess.

If there is no rain in the hathia, it is a waste of time to work at our orups. If there is no rain in the hathia, but there is rain in Chitra, it is useful, but it is not the

In the hathia this year there wer some water, but last rear it was almost dry, and we het our rice except where we lifted water on to the lands from tanks. Last year we could not moke arrangementa with the Nepalese, as they wanted the water for themselves.

## WITKESS No 45 .- MR. A. S. SHEBMAN, Farmer, Jainager.

Mr. A S. Sherman, a farmer.

- 1. Q. (The President )-Are you a planter ?-No; I am
- 2. Q. Near the Kamla river ?-Yes. 30 Oct. 02.

3. Q. You have heard shout the proposed canals from the Kamla; would they benefit your lands?—Yes.

- 4. Q. The estimate is about 104 lake of rapecs; one cannot expect Government to spend that money unless there is some return. Do you think the people would like to have a water-rate for the time they used the water, or would they prefer an unnual cess like the read cess?—I think they would prefer to pay an onanal cess.
- 5. Q. Do the people about this district wish to have irrigation?-Yes.
- 6 Q. Is there any point you would like to represent about irrigation in their lands and how they could be benefited? - They would vought by o canol.
- 7. Q. Have you known the Kamla river for a great number of years !- Yes.
  - 8. Q. Is it ever bunded in Nepal?-Yes.
  - 9. Q. Ie water stopped altegether P-Yes.
  - 10. Q. Does that often happen ?- Yes.

- 11 Q. (Sir Thomas Higham.)—They don't boud the whole of the water up?—Yes, the whole.
- 12 Q. (The President) .- Are they is the habit of deing that pretty often ?-Yes.
  - 13. Q. Are you referring to the main Kamia river?-Yes
- 14 Q. Is it often bunded up by the Repai people ?-Yes, and it is also done by a mahant.
  - 15 Q. Io British territory ?- Yes.
- 16 Q. Do the Nepal people close the river altogether? I have heard eo.
- 17. Q. (Sir Thomas Higham.) Is it ever dry ?-- Yes.
- 18. Q. Wheo ?-In April and May.
- 19. Q. (The President.)—Do you think they would hund it at the time of the hathia ?—No.
  - 20. Q. Wby?-Because there is too much water.
- 21. Q. (Mr. Allen.)—Do you think it would be quite impossible for the Repulese to bond it in October?—Yes.
  - 23. Q. Why?-Because the river is already rising.
- 23. Q Do they ever begin before April to bund the river ?- Yes, at the latter and of March.
  - 24. Q. Not before that ?-No.

WITNESS NO. 46 .- MR. P. T. ONBAET, Manager of Zamindari.

Mr. T. P. Onraet. 30 Oct. 02.

- 1. Q. (The President.)—You are a landowner, I understand?—I am the Manager of the Madhnbani
- 2. Q. Would your lands be benefited if the Kamla Canai were made?—If the Kamla Canai were extended to the Bolan so as to connect the two rivers and distributaries made to the west of the Bolan.
- 3. Q. What about the Bolan having moved six miles?—The big Bolan has not moved six miles in my zamindari; it used to go near Lokhai, but now the Bihool and Bolan have become one river. A great portion of the Bolan river runs through the north-enst portion of the district and hos remained stationary for a great number of years.
- 4. Q. Are the lands, you are interested in, on the banks of the river?—Yes, some of them are.
- 5. Q. Does it cause you any anxiety?—No; what it cuts on one side it makes up on the other.
- 6. Q. Do you know anything of the Nepaleso bunding the Kamla?—No; I hove heard of it casually.
- 7. Q. Have you reason to believe that in the Kamla river there would always he a supply of water for irrigation there at the time that it is required?—Yes.
- 8. Q. October is the most important month bere?-Yes, and end of Septembor.
- 9. Q. Supposing irrigation works were carried out, would the people be willing to pay n water-rate or

- have n cess?—I think myself that n water cess would be the hest thing, but the poerer rayets who have no paddy lands would grumble at having to pay it; they would gradually get used to it.
- 10. Q. Is the road cess much in this district?-Half nn nnas on the rupeo.
- 11. Q. How should a work like this be carried out; under the Public Works Department, or should the local outhorities manage it?—It it is going to be a big work, only the making of a number of distributorics, it should be done by the Public Works Department; if it is a email thing like the hunding of existing channels, it might be done through the District Board.
- 12. Q. (Sir Thomas Higham.)—Do you know anything of the land on the Kamla? Is it liable to be flooded by spills?—No. Bolan No. 2 is the one that affects my zamindari.
- 13. Q. You don't know whether that country is ever under spill?—I have heard that when the Kamla river does spill it comes to Madhubani, but I have never traced the source of it.
- 14. Q. (Mr. Mair-Mackenzie.)—Is it possible to do very much in the way of bunding up irrigation channels?—Yes, I think so; there are nullahs that cut into little Bolan No. 2; if embaukments were made neross them and the water kept as in a resorvoir, and small pains made, irrigation could be carried on.

Onract.

30 Oct. 03.

15. Q. Why has nothing been done hitherto?—Because the zamindars don't care to spend money; they cannot get mything more from the rayats, and the rayots are too apothetic to spend money.

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Salan Canalia.

- 16. Q. If a rayat got an increased produce, could not the zemindar get anything out of him?—The rayat objects to pay anything that is not down on his jamabondi.
- 17. Q. Would he not get something down in his jamabandi on account of on improvement made?—It might be done, but not willingly; not without recourse to low.
- 18. Q. Supposing you have a bad hothia and were -given water not later than the first week of November, would it not save the crop?—If there had been scanty rain before, the rice would be all parched up.
- 19. Q. You don't try bunding up your rivers in years of scarcity?—Only perfunctorily. I have not

mode channels like Mr. King. I think that is a very Mr. P. T. good thing.

20. Q. What has prevented you doing it?-It is a matter of expenditure.

21. Q. Have you had fomine in your part of the world?—No; not even in 1897.

22. Q. You didn't hove occasion to employ relief labour?—Government only made three or four tanks.

23. Q. Wero they usoful?—Yos; they irrigated largely from thom this last sooson and pumped them dry: the tanks soved many acres.

24. Q. Wore they dug primarily for oattle?—Most of our tanks have been dug from n religious metivo originally.

25. Q. I refer to work done in the fomine?—It was first for the sake of fumine relief work; they will do for cottle-watering purposes in future.

# WITNESS No. 47 .- Mr. A. W. WATSON, Sub-divisional Officer, Madhubani.

- 1. Q. (The President.)—You are in charge of a sub-division in this district?—Yes.
  - 2. Q. Have you been long here?-21 years.
- 3. Q. You were here throughout the lost famine?—No. I joined in 1900. There was only scarcity last year. I was away from August to Novomber. The scarcity, however, did not develop till after November.
- .4. Q. Where is your sub-division?—In the north-east, 24 miles from head-quarters.
- 5. Q. Is the Kamia scheme in your part?-It will tun through my sub-division.
- 6. Q. Is there any wish for irrigation there?—As a matter of fact, the rayats are entirely anathetic; they clamour for nater when there is searcity, but they are never willing to do anything on their own account; they expect you to provide oven labour.
- 7. Q. Have thore ever been any famine relief works since 1896-97?—Thoro was a special District Board work in the north-east during the spring of the current
  - 8. Q. Did that draw !- Not much.
- 9. Q. Was there dire need?—No; there is always a submerged tenth boardering on distress.
- 10. Q. So there is in London. Would these people accept a water cess?—If introduced gradually I think they would.
- 11. Q. Probably it would not exceed half an anna on the rupeo?—Of course the vast proportion would not at first willingly accept anything, but they might be induced to do so gradually.
- 12. Q. Would that be better or worse than a water-rate?—I think a cess would be much more satisfactory. In the three roins that I have known here there has generally been a break about twice in 20 days; and during these breaks rayats would be glad to take water even in normal years. They would not really want a large quantity of water more than once in four or five years.
- 13. Q. Is there any land in your sub-division under well irrigation?—Very little, and that is confined to opium. This is in the north adjacent to the Nepal frontier.
- 14. Q. Is there any demand for wells up there?-No; I don't think so.
- 15. Q. I suppose the opinit people give advances?-
- 16. Q. The famine relief programme is kept up at the head-quarters of the district, I suppose?—Yes, the Collector has it.
- 17. Q. (Mr. Muir-Mackenzie.)—Are you consulted as regards works to be put into it?—Yes, as regards my sub-division. While on tour Mr. Maddex and I made anguires about possible channels.
- 18. Q. Do you suppose, if you romained several years and carried out these works, you could find other things of the same kind?—The difficulty would be with the smaller landlords who are extremely non-public-epirited; with the exception of the Muharaja, no-body would give land for channels.
- 19. Q. Would the acquisition of land be expensive?
  -Yes, very.
- 20. Q. Huvo you power to distribute takari advan-e?—No. Some applications were made to me this

year; most of them proved to be mald fide. Numbers of people came in after Mr. Maddox's visit to the distressed area in the north-east, in the hope that money would be get.

30 Oct. 02.

21. Q. How far did the people come?-Mony from nearly 50 miles.

22. Q. They would not consider 50 miles too much if they thought money was to be had?—No, certoinly not and they paid Re. 1 and Rs. 2 to mukhtars for writing applications; many intended to lend out the money to others at a higher rate of interest.

23. Q. As regards well irrigotion for opium, do you suppose that would have been done if the opium people did not appreciate it?—No, opinm cultivation has been pushed a good deal.

21. Q. They have also pushed irrigotion?—Yes, no doubt.

- 25. Q. Has the increase in cultivation been largely due to irrigation?—I think so; it has proved very profitable.
- 26. Q. Would udvances be largely avoiled of for load improvement purposes?—I think so.
- 27. Q. For really bond fide purposes?—Yes, provided the efficer took sufficient trouble in the matter; the people would require constant supervision.
  - 28. Q. Is there any sugarcane grown?-Yes.
- 29. Q. Without irrigation?-Yes, a good doal is without irrigation. One factory has token to irrigation last year.
- 30. Q. How did they get irrigation there?—They lifted out the water from a neighbouring river and rou it in small channels.
- 31. Q. Previously had that lond grown sugarcane without irrigation?—Previously it had been indige lond.
- 32. Q. Do you know the area of this irrigated sugor-cane?—It is not very great.
- 33. Q. Not 100 neres?-Perhaps a couple of hundred
- 31. Q. Besides that there is a good deal of unirrigated sugarcane?—Yes, a good deal—some 8,000 acres. 35. Q. (Mr. Allen.)—Do you know about this scheme of Mr. Maddox's—the Behul and Karak scheme?—
- Yos. 36. Q. Wes there searcity last year?-Yes, along the frontier line from Lokelli to the north-east end of
- 37. Q. Did you discuss this scheme with the natives?

  No. but I got all particulars concorning it from Mr. Rennie, Raj Sub-Managor, in that aree.
- Q. 38. (Wr. Muir.Mackenzie.)—Is there much scarcity in Nepal? Do the people ever come over to your side?—Sometimes, and sometimes our people go over
- (Mr. Maddox.)-I think our men are more likely to go to Nopal.
- (The witness.)—A great many of our people go to Nepal, especially in the dhan-cutting season. We are not bothered with immigrants, but only with habitual thieves from across the berder, who constantly commit burglaries on our side.

30 Oct. 02.

# WITNESS No. 49 .- Mr. J. H. Kenn, Settlement Officer, Durbhauga.

- Mr. J. H. 1. Q. (The President.)—You are Settlement Officer in Kerr. this distrist?—Yes.
- 2. Q. Havo you been long here?—Yes, four yoars; 30 Oct. 02. oue year as Sub-divisional Officer in Madbubani.
  - '9. Q. I suppose you know the whole of the district?-
  - 4 Q. Have settlement operations been going on all through the year?—Yoe, sloce 1897; they are just huished how.
  - 5. Q. What is your opinion about providing for the fecurrence of future famins; a country like this suffers from extreme scarcity at intervals; should not irrigatism works be provided?—Ye, if possible, to do it at a reasonable cost, it would be an excellent thing.
  - 6. Q. Would the people take to lt?—Poople would take as much water as you gave them if the hathia failed, but in an ordinary year they don't require it and would not pay.
  - 7. Q. Are you familiar with the north part of the district?-Yes.
  - S. Q. Are the streams steadily bunded in the Nepal territory ?-- Yee, the Dhausis; I have never seen the Kamia absolutely dry.
  - 9. Q. Have you any sort of reletions with the people seroes the frontier?—Nepalese Subadara comotimes come across to see us.
  - 10. Q. Are they friendly?-Some are; some are very hangity.
  - 11. Q. Do you think there is room for earrying on irrigation works as a source of benefit to the Province?-Yes, certainly.
  - 12. Q. This difficulty about the bunding is a very serious one?—The Kanila could not pessibly be bonded in the fains; perhaps it could be bunded in Cotober; certainly not in September.
  - 13. Q. As regards levying a cess lu return for water given, do you think that would be accepted without a tremendous stronglo?—It would require legislation.
  - 14. Q Assuming that there was legislation?—I don't know about the people who are not benefited by irrigation; the cest could only apply to the tract where irrigation was affected; then there would be villagee in that tract which could not get water, and there would be rayats whose boldings were composed of lands that could not be reached by irrigation and these would have to be excepted.
  - 15. Q. (Mr. Muir-Mackensie.)—These otalistics of irrigation given by Mr. Maddox; ato they taken from your Settlement Report?—Yes.
  - 16. Q. The great bulk is in the Madhubani Sub-division. What is the difference in the conditions of that district from the ro-t?—Irrigation is available; there are more rivers. In the Sudder Sub-division there are more jhile where the water logs.
  - 17. Q. You said that there would not be ony willingness on the part of the people in ordinary years to pay a water-rate?—Yes, I think the ravats would take water in an ordinary year, but would not pay for it.
  - 18. Q. Mr. King said about 2 to 4 onnas might be gained in profit?—Even if this is correct, I don't think it would induce the rayats to pay for water in ordinary years.
  - 19. Q. Don't you think it is right thuy should pay?— Yes, if they henclited: e.g., if the water enobled them to plant out earlier than would otherwise he possible.

- 20. Q. That would be of use to them?—If they de take water at all, I blink they would prefer to hang on on the obsuce of soin.
- 21. Q. Mr. King said they would take water?—I don't think they would take it if they had to pay.
- 22. Q. Do you think there are a number of places in the district where irrigation could be improved from existing channels and new channels extended?—I am unt compotent to eay. I think that would be the best thing. I think, if something more could be done in the way Mr. King bes done things at small expense, the practical effect would be better.
- 23. Q. Madhulani does not seem to have been the most distressed district ?-No.
- 24. Q. (The Precident.)—Are these tracts that we see so full of water dry in the famine year?—I don't know. I was not here. I believe so.
- 25. Q. (Mr Muir-Mackenzic.)—Overthe existing rights of water in these private irrugation works there are many disputes; are there not?—There are disputes over tha bunds.
- 26. Q. You don't record the rights?-No-
- 27. Q. Do you think it would have been a part of your besiness to do so?—I doubt if the righte ore sufficiently determined
- 28. Q. Would it be a good thing to enquire into thematter and record the rights?—I now not clear what there is to record. This place is not like Gyo where rights are fairly well defined.
- 20 Q. Would it be worth while to record them in districts where they are sufficiently determined? Yes.
  - 30. Q. They would save disputes?-Yes.
- 31. Q. (Mr. Rajaratna Mudaliar.)—Have you power under the present law to enquire into rights in water and prepare a record of these rights?—We record fishery rights. We are not told to record rights in water,
- 32. Q. (Mr. Muir. Maclenzie.)—There are no legal obstacles in the way?—No.
- 33. Q. (Mr. Allen.) Do you know the Gya District? -Yes.
- 34. Q. If it was proposed to give the Collector power to animarily decide disputes regarding channels, do you think it would be good, or would you wait till the record-of-rights of different people in the channels had been made? Ho you think the Collector would be able to decide disputes in the absence of the record?—If he personally unquired into overy dispute himself.
  - 35. Q. Ordinarily speaking he coold not do so?-No.
- 36. Q. Could be get at the truth by sonding out a subordinate?—I think he would be greatly assisted by a record.

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- 37. Q. It has been proposed that the Collector should be given power to compel the isodiord to maintoin the gillandazi, where they neglect to do so; would that be practicable? It was proposed that he should be given an allotment and carry out the work bimself and recover from the landard?—I think it would be to the becefit of the land-lord.
- 38. Q. Would the Collector do that is practice, if it was supposed that the zamindar was not maintaining the irrigation works properly P—I don't see why he should not do

## SIXTH DAY.

# Durbhanga, 31st October 1902.

WITHESS No. 49-Mr. H. A. RENNY, Sub-Mansger, Durbbonga Raj.

- Mr. H. A.

  1. Q. (The President.)—I understand that you are a Renny.

  resident of this district?—Yes.
- Renny.

  2. Q. Have you been here a long time?—I have been 31 Oct. 02. bere 22 years.
  - 3. Q. Have you an intimate acquaintance with the northern part of the district P—Yes. I have always been stationed there.
- 4. Q. That is the part that is most liable to drought and scarcity ?—Yes, the northern portion of it is.
- 5. Q. There were two schemes discussed yesterday—the Dhous and the Kamia. As regards the Dhaus, a very important consideration seemed to me that the Nepal people could turn off the water whenever they pleased, and that just at the time it would be most necessary in this

district; it would be most necessary in Nepal; and that, therefore, we could not count upon the water when it was wanted mast. Would that be your own experience?—That is not my experience. I have never known water not available. There are five rivers running through my pergunual, and they are all more or less fed from Nopal. I um not now talking about the Dhouse, but about the rivers in Phulpams. The rivers I am acquainted with are these running up to the Barra Bolan.

- 6. Q. You say that the Nepal people nover bund these rivers I have never known them to do so. They aro, too hig, I think, to be bunded.
- 7. Q. (Sir Thomas Higham.)—Supposing you were to make works here, what is to prevent the Nepaless bunding the rivers hereafter?—I fancy we have get no control over them at all.
- 8. Q. If we taught them how to bund rivers here, they would prohably follow our example and do it there?—I dare say they would.
- 9. Q. (The President.)—Is the want of irrigation seriously felt in this country?—It has been felt on more occasions than one. In the famine of 1874 this portion of the district was the chief sent of it, and last year, if it had not been for rain in March and April, there would have been another severe searcity.
- 10. Q. I suppose people would not take water every year?—Most of them would take some water on the high lands.
- 11. Q. For their rice?—For their rice and for their rabi and for their bhadei too.
- 12. Q. And would they be willing to pay for it P-When I sent up the project as an original project, they were willing to pay four annas an acre.
  - 13. Q. As a water-rate ?-Yes.
  - 14. Q. That does not give very much !- No.
- 15. Q. Do you think they would accept a sessment?—I cannot say. I have not sounded them on that point. I have not contemplated a cess. I have always thought of a waterrate.
- 16. Q. Do you think there would be a domand for water oftener than once in four years?—I think it would be offener.
- 17. Q. Have any engineers ever been up here and looked at it from an irrigation point of view?—Before my time Mr. Finneauc, who was here, started a scheme which you have seen, and subsequently Mr. Barton has been all over the pergunah.
- 18. Q. Is any one of them which you would particularly recommend ?-1 think Mr. Figurano's project would be the most usefel one.
- 10. Q. (Mr. Muir-Mackenzie.)—What was Mr. Finn-cane's scheme?—The Baikul-Karag scheme.
- 20. Q. (The President.)-I think, in the absence of any thoroughly worked out scheme, what we have chiefly got to

do is to enquire whather it is necessary or desirable to have irrigation there and to spend a certain amount upon it, Renny. wastnor the water is available and whether the people would appreciate it enough to pay something for it. If these points are settled in favour of the irrigation, then we would say there is a prima facie reason for taking the thing up and examining it thereonely. Yan say the Nepal people have never bunded up these rivers?—I have never known it.

- 21. Q. You say the people would pay a water rate of five annua an acres Yes.
- 22. Q. You cannot say whether or not they would consent . . to any oess?—I have not gone into the cess question.
- 23. Q. And do you think distinctly that it would im-rove the situation very much if there was irrigation?— Vory much.
- 24. Q. And it would increase the value of land?—It would increase the value of land and bring it more under cultivation.
- 25. Q. Is there much waste land?-There is a good deal in the northern part.
- 26. Q. The rivers are large ones?—The Bolan is a very large river; the Panei is a large river; the Bihwal is not a large river.
- 27. Q. Is it the case that the liolan has moved 6 miles? It has moved 6 miles and now it has amalgamated with the Bilimal.
- 28. Q. Do these rivers sprawl over the country, or have they their own beds?—They have got their own beds, and that is what makes the project so much easier I have thought.
- 20. Q. The Bolan has not kopt to its bed ?—No. All the others have kept to their beds.
- portion of the perguanah; there is not to the eastern portion, 30. Q. Is there much rabi cultivation ? - To the western
- 31. Q. (Mr. Muir-Mackenzie.)—About the movement of the Bolan do you know where the movement commenced? Has the maxement taken place south or north of Saswa?— North of Saswa.
- 32. Q. (The President.)—Sir Thomas Highma suggested that if Nopal should take it into their head to bund any these rivers, there is nothing to prevent them?—I have already answered that question. I am not sufficiently acquainted with Nepal, but during my experience of 22 years there has been no difficulty of that kind.
- 33. Q. What one would like to know is whether there would be any inducement for Nopal. The question is whether they have the cultivation there?—They have get the cultivation. They have get the dhan country running along the foot of the hills.
- 34. Q. (Mr. Allen.)-Is it within your knowledge that rice cultivation is spreading in Nopal?-No, I do not think so.

WITSESS No. 50 .- The Ho'ner Mr. D. B. Honn, Chief Engineer to the Government of Bengal.

- 1. Q. (The President.)—You have heard all the ovidence given at Bankipore by Mr. Toogood and other engineers. Are there any points in which you disagree with them?—No. I think all their evidence is very accurate.
- very accurate.

  2. Q. I wanted to get out what the country would have to pay for the luxury of navigation in the Sene Canale, and I anderstood it was about 20 per cent. of the total?—That is about the nearest approximation, I think, we can make. Navigation added about 25 per cent. to the cost of the Sone Canali. The locks cost about 30 lakhs, and I should say we could easily put dawn at least 20 lakhs more for other savings. Then for maintenance there must be a large percentage. There is all the lock establishment, and renewal of lock gates, etc. Gate renewal servery expensive. The cost is not so much in the Sone Canals, as it would be in the tidal causes. The destruction of gates in tidal canals is very great.

  3. Q. We asked Mr. Toogood whether anxigation
- gates in than candle is very great.

  3. Q. Wo asked Mr. Toogood whether invigation was very much appreciated on the Sone Canals. Ho said "yes, the people like it." But his answer was givenin a maunor which led me to believe he was not very enthusiastic over it, and that he did not take it as a very great boon to the country. Do you consider it has been appreciated largely?—I don't think so. Of course it has been a convenience to the people to

have steamers running up and down the canal prior to the introduction of railways to the south. I might; however, say that, as far as the parigation is concerned when I was at Buxar in 1887 I built a now gola at Sassaram and exporters would not use the gola.

- 4. Q. What do you call a gold?—A store-house, for grain. I thought exporters would bring their grain to be packed and sent down to Buxar by canal. Instead of this I found they used carts and conveyed the grain down the Grand Trunk Road to Zammania in proference to the canal. I usked them why they did this, and they said "wa have got our bullocks and we have got nothing for thom to do. We prefer to use them intend of paying canal tolls,"
- 5. Q. (Sir Thomas Higham.)—Do you have bullock traction on the canalr—No. It is nil by hand. Navigation has been an absolute failure. I think, if we had made only one line navigable, it would have been sound; making all three canals navigable was a great mistake.
- 6. Q. (The President.)—About irrigation, you say the leases are taken up very readily?—Very readily, and of course the conditions are becoming more and more severe; we are getting more and more particular every year about the channels being properly kept up, and lease boundaries.

31 Oct. 02.

Mr. D. R. Horn.

7. O. What is exactly the basis of all leases?—We select a block. It may be all in one village, or it may be part of a village. If we have a very big village commanded by two or three distributances, we may have several blocks in it. Mr. D. B. Horn 31 Oct. 02.

8. Q. Would it embrace several villages?—No. a rule we confine a block on the Sono to one village.

- 9. Q. You have got varying rates of irrigation according to the crop?—Not for the blocks. We have one uniform rate; inside the block a man con grow sugercane, robi and rice.
- 10. Q. What does he pay you?—He pays as all-round rate of Rs. 2-8 per acro for the block. If he wants het weather irrigation for sugarceae, he has to pay an extra bet-weether rate.
- 11. Q. In the event of irrigation being very popular, and there being a demond for it, would it be on easy motter to raise the rates for the new lesses and make it Rs. 3 instead of Rs. 2-8 per cere?—We mean to do so when the existing seven-year leases fall out. I think they fall out next year.

· 12. Q. The whole of them?—A certain aumber will. We started seven-year leases in 1897. Formerly they

We started seven-year leases in 1897. Formerly they wore for five years.

13. Q. That will bring you presumably a considerable increase of reveaue. Do you suppose it will chake off many of the leases raising the rent?—I dea't think so. Our position is very strong. The villagers have got se accustomed to water and have realised its full value that I doa't think we shall have any trouble at all. We increased the rate about seven years age and there was no diminution. If you look at the list for the last 10 years, you will find that the leases are steadily increasing in aumher.

steadily increasing in aumher.

14. Q. What proportion of the whole irrigation is by lease?—I think about 85 per cent. Robi irrigation a varies enormously according to the senson. The irrigetion I am talking about is khorif. There is a proportion of rabi and sugnreane in the leases. They have get the right to grow rabi under the lease. When we started first of all the robi area was very large, but when the villagors found that they were niways ensured a supply of water, they have gradually converted robi lands into rice laads.

15. Q. Is the sugarcane on the inercase to any extent?—I don't think so. Sugarcane arrigation is not very much; we are restricted in the hot weather for supply. The Sone russ down to almost 300 cubic feet a second in May.

a second ia May.

16. Q. To go back to my former question, what proportion of the irrigation is by lease; about 85 per cent. you say?—I should say quito that of the lharif area is under lease. You heard, Sir Thomas, that the people are getting too mach water. I was very pleased to hear that. When we had the Irrigation Committee in 1837, things generally were all the other way; that is to say, we were accused of not giving sufficient supply. We shall have to proceed very ceuticasly with the Shahabad cultivators. They are very troublesome.

are very troublesome.

17. Q. I gather it is not the policy of the canal authorities to fill the ahars!—Not at all. That is how we came to such trouble at first. We admitted water into a lattle uadefined channel running iate the lease, and what the villagers did was to let the water into their ahors, and then when we tried to assess the lands, they refused to pay and said "this is not your water; it is rain water," and we had no proof it was act. Then we adopted the policy of no leases except to good blocks with defined village channels.

18. Q. If they came to you and said "we want to fill these ahase for what will you do it?" When you have water going to waste you may just as well store it in the chars!—We do fill chors when we are closing the conal in the hot weather. We put water into the ahors for drinking purposes and for cattle.

19. Q. Might it act pay these people and add to your revenae, if you said "our leases are at Rs. 2-8 per acre; besides that, if you have got an ahar, we will keep it filled for you for so much"?—We have most got our limit now, and all our five-year leases are irrigated from proper channels and proper outlets.

20 Q. Do you think they would not irrigate further and would not make their blocks higger, if there were store-houses for water in the shape of ahars?—I don't think so. It is a wasteful system of irrigation.

21. Q. I entirely agree with you that it is a wasteful system of irrigation in a case of short supply of water. But in a year when there is Same water going out into the Ganges, it might be just as well as to store

it, instead of letting it go to waste?-Wo don't waste . any water.

22. Q. During the floods?—We close down.

23. Q. During the lost year of scarcity, if your ahars had all been full, they might heve pulled you over this difficulty. Would it not have been an advantage?

—We have had a had experience of ahors. There is constant friction between the villagers and onselves about losing control of our weter.

24. Q. (Mr. Muir-Mockenzic.)—How exactly do you lose control of the water?—At first we ellowed water to lesses with imporfect villege channels, and the villagers used to take it down into these ahors and irrigate their lond which was not within the lense at all. When we tried to assess them, they said, "it is not your water; it is rain water." We could not prove it was not rain water. There might have been rain water in the ahor in an ordinary year.

25. Q. Could not you give water to the oher on condition that any new nrea irrigated from the ahar was charged for?—I think all the area pretty well commended new is under lease. I also understand that the ohers are folling into disuse.

- the ohars are felling into disuse.

  20. Q. It is in ovideace that you may have a large surplus of water in the cerly part of the year, mue then of the holhte when you may want every single drop you have got. If you could store the water in ahars in the early part of the year, you could guard to a certain extent against the eventuality of having all your water exhausted?—We have only had this experience once in 30 years, and I think, if we begin to let water nate the ahars again, we would gradually work back to the old system in losing centrol of tur weter. These ahars are scattered all across the country, and those of one villege are connected with those of another. It is a most complicated system. We have accepted this principle now that, if we lose control of our water, we cannot assess.

  27. Q. Mr. Toogood seemed hardly to have accepted
- 27. Q. Mr. Toogood seemed hardly to have accopted that principle?—I don't know. In the Eastern Sono it is very sandy soil.
- 23. Q. (Sir Thomas Highom.)—Are you speaking of ahars in the middle of a block or outside?—A block may be above the ohar or below the ohar.
- 29. Q. There is no objection to their filling ohars in the block?—But these ahars go into other villages which may not have a lease.
- 30. Q. What is your objection to charging a fee for filling them? I am not speaking of outside ahars, but supposing a man who had an ahar in a bleck came to you and said "I will give you a rupee if you fill this ahar." What is the objection to that?—I don't think he would come forward, and besides I say thet, once you lose control of your water, you are helpless.
- once you loss control of your water, you are helpless.

  31. Q. You would not lose control of your water in that case. The difficulty I see is what you say that when you irrigate from an ohor you cannot sey whether the ahar was filled by rain water or canal water. But if a mon comes to you and says "I have not got much rain water in my ahar, put a couple of feet into it, where is the difficulty?—We have tried selling water by volume, but I don't think it has ever come to very much. to very much.

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- 32. Q. Before the hathia you have a lot of water?— Yes, there is never any lack of water for transplanting the rice.
- 33. Q. You have a great deal more water than you want before the hathia, and you don't seem to be able to de mything with it?—In a favourable year these ahors are filled by the rain, and the people won't ask for water outside the lease until the rains
- 34. Q. But supposing it were a dry year?—How are we going to know when the hothic is going to fail.
- 35. Q. You mean to say the people will not apply?

  —Yes. They have got these ahars and they always contain rain water in the season, and very likely they else contain water from our five years' leases. It is only in a very dry September that they fail and the villagers would never apply to have them filled until it was too Into.
- 36. Q. You don't sell water by volume?—Whea leases come in inte and we don't want to measure, we say "We will keep an outlet open for you for 24 hours at so much," but I think very little has been done in
- 37. Q. Supposing it were generally known that where there were no leases, if the people liked to apply for water for their ahars hefore the hathia, you would be prepared to fill them up at so much a thousand cubic feet, would they upply?—They won't apply before

the hathia. That is what led to our long lease system boing introduced. We found that these people would wait till the last mament until the middle of October and then they aften got water too late to benefit the crop for which remission of water rate had to be given.

38. Q. Would they pay a definite sum to have their chars filled up?—Filling the chars would only benefit the unlessed areas beyond the long lease area, and the villagers would never apply until the hathic had failed when no surplus water would be available.

39. Q. Why not let them apply far their chars far five years? Why nat have a five-year lease for chars also?—In my opinian this would be a retragrade stop in canal administration.

40. Q. You have certain years of drought. They are not vory common parhaps, but say they take place once in five years. You propose to reduce the size of your autlets and so raise the duty. Would not the pressure be greater in these exceptional years than you have ever had?—I don't think so. The people are very extravagant in the use of water at recent. present.

41. Q. The more yau raise the duty, the mare that tension comes on at the times of trial?—I dan't think so. They will know they have only get an authat open far a certain number of days and they will take good care to irrigate their hind within that period. At present the outlet is 10 days opened and five days closed in the hathia. We hape to reduce it and make it, say, nine days agen and six days clased. That will spare a good deal of water and emble us to irrigate more than we can now.

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42. Q. You will ultimately come to your limit?-Yes.

43. Q. You have got a very good duty out of that; 86 acres?—We only got 50 in a year of bad hathia.

44. Q. The canacity of canals is dependent upon tha amount of water you can get down your canal during the hathin?—It is only succe we have started to wark on the Sone system that we have found aut that fact.

45. Q. Yau said here that the average actually has been 86 neres?—Yos, 50 at the outlet, but all these duties that are based on the four months' discharge are quite misleading.

46. Q. (The President.)—We know that you are interested in the Karamaussa project. I suppose that if you can command the establishment, you will have it surveyed?—Mr. Toogood and Mr. Harris are going up in the middle of next month to see the sites. I have written to find out it any of the agents of the Muharajah of Benures knaw the country and whether it is open, so that I may have some contours taken to find out what the capacity of the reservoir is likely to be.

47. Q. (Mr. Mair-Mackenzie.)—I see in the month of September that in the Sassaram Sub-livision the average rainful is 7.15 inches. In the year 1892 it went down to 2.42. In a year like that would the people not apply to have their ahars tilled?—Na, 1 don't think so. In fact, as I say, their ahars are gradually being done away with.

and think so. In thet, is I say, then thous are gradually being done away with.

48. Q. (The President.)—To go back to the Karamnassa, I have not looked sufficiently at what plans there are. Do you comtemplate that it possibly length help the Sono system?—The original idea was to carry on the main western canal through Sassaram up to the Karamnassa and on to Mirzapore. This was stopped, because, as I said in my note, we had not sufficient water in the Sone so the Karamnassa project is now praposed. The Karamnassa is the river an the axtrome west of the district. Instead of taking the water from the Sone towards the Karamnassa, water will be brought from the Karamnassa back to the Dargaeti into all that Bhabua tract which we know is very lable to scarcity of rain. In Bhabua, in my note, I have shown that the hathia rain failed about 12 times in the last 20 years. If you go lower down into Midnapare, you will find there were anly two bad years and one doubtful year in 20; whereas, every alternate year in Bhabua has a failure of the rainfall which is required to bring the rice into car. to bring the rice into car.

49. Q. Ta go on to Champaran and Saran, this side of the Ganges, I understand that yan look on the Saran project as altogether a very doubtful one; I mean these canals from the Gandak?—They have proved most unsatisfactory, and I don't knew quite what the reason is. They have been working for 20 years, and I suppose one of the defects of the scheme was that there was no regulator in the sada. was no regulator in the sota.

50. Q. I gathered from one of the witnesses at Mazafarpur that at one time, when they wauted the canals opened in a lurry, the ahannals had silted up, and thus the opening did not occur till six weeks after when it was too late, and they did not care to take the

water. That could not have happened if there had been a regular establishmant maintained by the Government ar the District Board whose duty it would have been to see to the silt clearances. I don't think and has a right to say that it was a hopoless case, because it has not been very successful hitherto from want of management?—I think it is really worth while to investigate it and draw up some scheme that would bring it more into line with the Sone. You would have to construct a regulatar outside the embankment in the first place, but without a survey it is impossible to say what additional works are required.

51. O. From these rainfall statements I make out.

51. Q. From this rainfall statements I make out that every third year here is a year af drought. For instance, in Gopalgunga, in 20 years, there have been six had years, 11 good and three doubtful ones, which were pretty near bordering on the bad years?—Yes; and Gopalgungo is pretty central for this Saran District. I think from the evidence and from the rainfall statements it is clear that irrigation for the rice crop is necessary more frequently than the witnesses at Saran made out.

at Saran made out.

52. Q. I would even go further and say that the fact that the thing existed at all, being left ta itself without the controlling hand of an engineer, gives ane a fair reason to hape that in better heads it might be a success. What da yau think?—I think it is very well worth enquiring into. The Local Government has spent 7 lakhs, and I think wo might safely spend a little more mency in the hope of making the scheme a success. At the present nument all this mency is simply sunk and lying idle.

53. Q. Did Mr. MucCarthy any that gauge-readers.

53. Q. Did Mr. MucCarthy say that gauge-readers were kept up on the Gandak?—I am not quite sure that he is accurate in what he said about gauge observations in the Gandak. It is most essential to have observations taken in all rivers likely to be utilised such as the Kamla and Bagmati. I think the District Beards might spend a little money in this way. It would not cost much to have one or two gauges established on these rivers.

64. Q. What do you think of the Tribeni schemo?—
It is going on. Mr. Butler hapes to do very woll this year. The tract is unhealthy; it is foverish, and the coolies gave it a bad name last year. I think more perfect arrangements have been made this year for pushing on the work.

55. Q. How are you getting rid of the cross drain-age?—In some places the canal is syphoned and in others carried in aqueducts.

56. Q. Havo you get funds to earry it on as fast as you wish?—Sir Thomas Higham says we can get any money we like. We have get six lakes this your, but he says we need not be tied dawn to six lakes; we can get ton lakes if we like.

57. Q. What is the estimate about?—Rs. 37,91,000, including establishment.

58. Q. Do you consider this Tilari project pramising one?—I am ufraid not. From Mr. Maconchy's report it will be seen he is very decided and expresses himself very strongly against it.

50. Q. Thon what do you think of these three projects,—the Tilari, the Bakhiya and Pussa?—I am afraid they would fail just at the time water was required. They are small strongs and could be very easily bunded up above by the Nepalese.

60. Q. Mr. Muconochy in his report says:—"The Douse scheme may, perhaps, be placed in the same entegory: for, nithough there were two bunds across the nullah in Nopal, there were also three bunds in British territory, showing that there was some water to utilise for irrigation. What do you say?—Yes.

61. Q. What is to'r opinion a regard the Bagmutty?
—The floods are the great obstacle here. This canal rans right across the draunaga af the country and as it is not possible to construct flood ambankments in Nepalese territory the irrigable area cauld not be protected as is the case in Orissa.

62. Q. Thon you reserve your epinion about the Bagmutty till more is known about it?—I think the suggestion that Mr. Disney made is warth enquiring into. That does not interfere with the cross drainage in any wny.

63. Q. (Sir Thomas Higham.)—That is warking on the same lines as Mr. King has been daing?—Yes.

61. Q. You have spent Rs. 52,000 on pains and cuts for making these canals?—Yes.

05. Q. (The President.)—Do yau think there are any of these rivers we can leave ant of consideration at once, or do you think it is an apon question with regard to them all whether they can be utili ed?—I think these four—the Tilari, the Pussa, the Bakhiya and

Mr. D. B. the Dhaus might be obliterated, as they would fail Horn. just when required.

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  - 66. Q. Anyhow you could put them in a second line 66. Q. Anyhow you could put them in a second line giving proference to the others?—Yes. As regards the Bagmutty, Mr. Buckley and Colons! Haig have elwaya admitted that a woir is essential across the river and therefore you must get as big an area as you can te irrigate. As far as I have read the old papers no one seems to have dealt with this question of carrying the canal across the whole of the drainege of the country which is itself liable to heavy floods.
  - 67. Q. (Sir Thomes Higham.)—You say there is seme scope for work of the same kind as Mr. King has been doing?—Yes.
  - 68. Q. That consists of carrying out works according to the exigencies of the season. They may go, I understand, for two or three years without doing anything with these canals?—Vory likely.
  - 69. Q. Then when they know thore is a demand likely to come on they sot to work and open a channel where it is required and make a bund?—Yes. After the scason is over they put a bund across the mouth to keep the sit out in years when the channel is not required.
  - 70. Q. The Public Works Department are aiming at making an arrengement which will involve a heavy capital cost, and then be more or less permanent. But for a work like Mr. King's work, you will require men on the spot nible to see at once what is to he done for the season, and who must be able to lay their heads on money of eace?—Quite se.
  - 71. Q. I don't know how such a schome could be worked except by a District Engineer?—That is how it should he dane. You could not drann of working it in any other way.
  - 72. Q. I den't see what is to provent its breeking down as the Saran canels have broken down?—The Saran canels have been working in very much the same way.
  - The President.—They had not got a Mr. King there?—That is the difference.
  - 73. Q. (Sir Thomas Higham.)—There is this danger, I suppose, that a season may come when you cannot get control over the water?—Yes, and when that time comes, then the question of a permanent regulator will have to be considered. Of course Mr. King was getting water all through September. His scheme has therefore got that great odvantage over the Seran cannals.
  - 74. Q. You could get water all through September in the Sorau canals?—Not to the same extent as he did.
  - 75. Q. There is lots of water in the sola. What is to prevent your opening the shices?—I should think there is a good deal of oilt in the sola after each freshet. He got supply from the main river.
  - Too. Q. You mean in Saran?—Yes. I don't think they ever opened the sluices until October in the Soron conels. They cannot bund the sola until the river falls to a certain level.
  - 77. Q. There is no reason why they should not be

    We have come to a deadlock now. The Government
    is not going to spend any more money on maintenance
    and the zamindars won't pay the maintenance charges.
    The caush are only opened now when the civil officer
    says it is obsolutely necessary to save the rice crop.
  - 78. Q. That is low they are never opened until October?—We did sanction the opening of them this year in September, because there was not sufficient water to do the transplanting, but we told them we could not open them in October again unless they paid some money for the cost of clearing the channels, se we are new absolutely at a deadlock.
  - 79. Q. They have paid nothing?—They pay no-
  - 80 Q. Are they open now? Has anything been done to shut the water down?
  - Mr. Hare.—They are open now.
  - 81. Q. You have not got your contribution?
  - Mr. Harc.—No, they may be closed now. I am not quite sure.
  - Witness.—I think they are closed. I could not be certain, but I think they must be closed.
  - 82. Q. Has any money been paid for this year or ever?
  - 83. Q. (Sir Thomes Higham.)—The Tilari project is probably hung up, becomes there is no certainty as to supply?—Yes.

- 84. Q. How much do you want for that?-50,000 acres is the area commanded; 200 acres of kharif to the squere mile would mean 60,000 acres.
- 85. Q. How much water is wanted?-300 cubic feet.
- 86. Q. Would it be possible to get that down in the Tribeni?—We are baving a lot of demands on us now for the Tribeni.
- 87. Q. I suppeso you could make it as lerge as you liked?—We propose to extend the Triheni. We have raised it up to 2,170 cusees but we have another demand across the Sikrana. I should like to get ocross the Sikrana and Tilari.
- 88. Q. You could not go across the Tileri?—I have no personel knowledge of the district.
- 8D. Q. Is it too late to consider the question of calarging the size of your syphoas, so that, if you want to carry out these doubtful schemes, you will get more water there? Supposing you put five or six thousand acres on to your estimate, the Tileri, Pussa and Bakhiya would mean another 30,000 acres, plus perhaps 30 squere miles across the Sikrana?—We would have to provide altogether for another 40,000 acres; that would be about 800 enhic feet.
- 90. Q. Your syphons are new devised for a full supply of 2,170 cusces?—Yes.
- 91. Q. They consist of 6 feet barrels. If you were to make all these harrels 8 feet, you could increase the capacity of the syphons by \(\frac{1}{2}\). It is not too late to do that?—No.
- 92. Q. Do you think it would be worth while deing that?—I den't knew if the money is available. It is cortnialy worth considering.

- cortnialy worth considering.

  Sir Thomas Higham.—I don't think there would be any difficulty in getting the money for it.

  93. Q. (The President.)—I suppose, if 40,000 cubic fect were wanted, you could have it there. There is no limit?—No, there is no limit; but we might have oventually, I cannot sny, to build a regulator.

  91. Q. Then you think it worth while to increase the size of the syphons?—I think so. We only provide for 200 acres to the square mile at present. It is said to he a good rice country and only wents to get water to produce 250 or 300 acres to the square mile.

  95. Q. (Sir Thomas Higham.)—You have not worked
- 95. Q. (Sir Thomes Higham.)—You have not worked up to that on the Senc?—No. We have only worked up to 138 acres to the square mile there.
- 96. Q. We have heard that the Saran canals have been known to irrigate 22,000 acres in one very dry year. Can you say hew they get held of the figures?—I don't know. I believe they did try to assess the rayets, but they could not realise anything.
- 97. Q. How did they try to realise?—I presumo they had some sort of measurement. But as regards that 22,000 eeres, I don't know how reliable it is.
- 98. Q. How is one to find out?—I dere say Colonel Hodding could tell us.
- 99. Q. The Irrigation Department put all these areas in their reports. Where did they get their figures from?—I don't knew.
- 100. Q. It is said that a portion irrigated by the Sone canols is never paid for; that it was outside the blocks; have you got mything to say about thet?—A rayat may pass water on his field to outside areas.
- 101. Q. How did he got the water on his field?-
- 102. Q. He lets the water go on to other land; that land got a crop and pays nothing?—These people may be equally oursions to get rid of the water before the hathia, so it would be a disodvantage then, as it might do harm.
- 103. Q. Does much irrigation go on in that wey that is not poid for?—I don't know.
- Mr. Mair-Mackenzie. Mr. Toegool sold there was a substantial amount in the Eastern Sone Division. I have since ascertained. It is about 4,400 acres a year
- 101. Q. (Sir Thomas Higham.)-You den't think that is an important question?—No; we have got our value for the water givea.
- 105. Q. In reference to the works that have been done on the Baguntty, do you recommend the cut being completed to see what could be done with it?—I think it should be enquired into.
- 106. Q. The District Engineer could say what he oposes to do with it?—Yes.
- 107. Q. I understand he wishes to work up in connection with these two rivers?—I don't think there is nay field work done. Mr. Disney's proposals ore not besed on actuel surveys; they are simply in the

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103. Q. Should it be done by the Public Works Department or the District Engineer?—It might be taken up by the District Board.

109. Q. (Mr. Rajaratna Mudaliar.)—With regard to what you said about the block boing drained, what is the area of rice under the Sone canals?—\$20,000 acres are irrigated.

110. Q. If all that water is to be drained, it would be capable of irrigating an appreciably large area outside the blocks?—Yes, the people don't want water when they let it go; they always want to dry their fields 15 days before the hathia begins.

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111. Q. Does this water benefit the crops outside the block?—It does not; overybody wants to get rid of the water at the same time.

112. Q. The area outside the blocks are not likely to have over much irrigation; are they?

113. Q. (The President.)—Our experience on the Nile was that the water used in rice irrigation always washed a certain amount of salt from the soil and did harm if we attempted to irrigate twice with the same water?—I have had no experience of that.

114. Q. If you constructed drains to earry of water, would the people outside the block areas be induced to apply for water?—I consider the acres irrigated outside blocks unimportant.

115. Q. (Mr. Muir-Mackenzie.)—Mr. Toogood said that the amount of land that obtained water in this way was in one part of the Sene so great that it checked irrigation?—The eastern side is very backward and the soil is very sandy and uses more water; there is not the same held ever the water; whether it is due to the individual officer I nun not propured to say; it is 12 years since I left the Sene.

116. Q. (Mr. Rajaratna Mudaliar.)—If water is stolen have you no power to charge water-rates?—
If it was due to carelessaess on the part of the canal staff, I should punish them.

117. Q. You have a separate measuring staff and a separate staff for collecting; do you see any objection to the Doputy Collectors checking the measurements of the separate staff?—I don't think they could for want of training.

118. Q. Could not Deputy Collectors and Sub-Deputy Collectors be trained to check measurements?—With what object?

119. Q. For the sake of efficiency?—There is suffi-clent efficiency now. All our collections are get in in timo.

120. Q. It is a question whether the whole of the amount is get in P—Our men are better able to do it, though they may not check each individual field they know the area of the block.

121. Q. Is your block proporly domarcated?-122. Q. (Mr. Allen.)—You said that the cost of keoping up navigation on Sone was considerable. Would you recommend the abandonment of navigation on the Sone?—Not at present when the lock gates require to be ronewed it may be considered. We are reducing the number of men all round, but we must keep up the lock gates as they are. I probably exaggerated in saying that it costs a great deal. It does not cost on much as I at first imagined.

123. Q. You would not drop it altogother?—I certainly should not.

.124. Q. We have had some evidence about the small .124. Q. We have had some evidence about the small area of rabi irrigated from the Sono canals; don't you think, as a matter of fact, the rabi has been extinguished by the extension of aghani!—That is true to a great extent in the long loase areas, but if there is a bad hathic on all the western side of Shahabad, we get a large rabi area.

125. Q. The tendency of regular irrigation must be to cut down the rabil—Yes, at first it was 30 per cent, in every 5-years lease, now it is much loss.

126. Q. With regard to what you said about the Karamanasa, do you propose to inspect the Durgacti scheme also?—Yes, I don't think I shall be able to contour the reservoir site this season.

127. Q. Why?—For want of staff. I mean to try and get it done. I am not cortain what staff will be required for the Karamassa.

128. Q. Wo have heard of the prospect of investigating certain small schemes in the Terai similar to Afr. King's; have you a staff of engineers to do that work?—I am afraid not, but the District Engineers have got a good deal of local knowledge. I should require a survey staff as well.

120. Q. Have you the material to organize a survey staff? You have the Karamnassa, Durgaeti and other schemes along the Himalayas?—No. I think the District Engineers could give a good deal of assistance

130. Q. I think the answer is, you have not sufficient men?—Not to take them all up at one time.

131. Q. What class of men would you require, as regards these minor schemes?—Temporary surveyors, once having settled the lines on which we are going to work; it would not take long to survey and lovel these lines; the question is who is going to provide funds for the investigation. I have since decided to give money from Imperial and Provincial Funds.

132. Q. Mr King spoke about dotailed examination and personal trouble taken. It does not appear that the survey could be done quickly?—I think he refers to the distribution of water.

133. Q.( The President.)—Have your canal officers on the Sono canals get magisterial powers under the Canals Act?—Yes.

134. Q. Do they exercise these powers?—To a very limited extent,

135. Q. There are certain penalties for breach of certain sections of the Canals Act?—Yes.

# WITNESS No. 51 .- ME. L. HARE, Commissioner, Patna Division.

## Note on Irrigation Works.

1. I have nothing to add to the particular information supplied by the District Officers in their replies to the questions of the Commission.

2. I would wish to bring to notice the desirability of legislation to give power to the Collector to interfere in easo of the construction of bunds in rivers—

(a) In order to prevent disputes and rioting.

(b) To prevent pureasonable waste of water to the detriment of those who live lower down the river.

(e) To provent grave and meterial alterations in and diversions of the rivers which may seriously affect the country.

3. I would recommend definite recignition and acceptance for the principle that, in the case of schemes in which the demand for water is intermittent, and consequently the receipts from the sale of water are irregular and onecrtain, a cess should be levied on the lands protected by the

(a) The bonefits are so great as to secure ample return to the cess-payors,

- (b) The payment is in the nature of an insurance against failure of crops and famine which should be borns by the area protected.
- 4. It would be necessary to legislate. The amount of cess se leviable would be limited by the Act. It should be puid for five years at a time, and so calculated that, with the receipts from the sale of water, it sheald cover working expenses and a reasonable interest on the capital expenditure.
- 5. I would lovy the cess direct from the occupiers along with the demands for water supplied to the same manner as the present canal dues are levied.
- 6. This proposal would apply to schemes propared by Government. I would at the same time provide for the case in which application was made for irrigation works on lines corresponding to those of the Bengal Drainage Act, i.e. suitable suhtmes approved by Government would be carried out in a tract where the majority of the persons interested accepted the scheme.

1. Q. (The President.) - Mr. Maddox in his paper says: - "I notice that the total cost of famines since 1873-74 has been Rs. 76,18,274, excluding the snount spent by the Maharaja in 1876-76." That is in the one district of Mahamin in 1876-76." Durbhaoga?—Yes.

2. Q. Has there been fairly good value obtained for that P-No, oxcept as regards saving of life.

3. Q. Woold it be a fair test of the inteosity of famine in the different districts to compare the amount spent of relief works P-It will be much fairer in future, as there

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- will be a Cammissioner appointed ander the Code to ensure a uniform system.
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  4. Q. Are your programmes of relief works complete?—
  31 ('et. 02. I think we should have more schemes which give a promise of being really neeful, worked out is detail and kept ready. In the past famines we have been, I think, too apt to select works which were convenient and not those af real volue.
  - 5. Q. (Mr. Muir-Mackenzie.) That was, I suppose, largely swing to want of time?—Yes, to some extent, and also to the idiosystems of the efficer dealing with the enbject.
  - 6. Q. (The President.)—The tendency bes been more end more to give rollef in much lerger proportions?—It is much more difficult now to resist applications for relief.
  - 7. Q There was more relief in 1896 than in 1876?-No. I think it is the other way.
  - 8 Q. Are you satisfied with the system on the Sone Canale with the amount of revenue anthority possessed by the canal engineers ?—I think the system is working very well.
  - 9. Q Are the relations of the district and canel officers quite satisfactors ?—Yes, quite. When the Lieutenant-Governor went down the year before last there were crowds at every lock, but there were no complaints, merely petitions te get water e little eheaper.

10. Q. There were no complaints of injustice ar hard-sbip ?- No.

- 11. Q. Yen have no doubt of the importance of previding the Bhahue Sub-division with a supply of weter? None whatever.
- 12. Q. I think your epinion is that in the Saren Canels a cess would be acceptable?—I think so if you can show that you ere giving them value. Whether eccepted ar not, I think it should be levied if you can give them value. In that ease we would have to meet an outery, a paper outery, not from the people concerned; there would be strong objection is the Landau Constillation. tion in the Legislative Conneil.
- 13. Q. An organient used would be that all had to pay, although all did not beneat equally ? -Yes, that woold be one line. I should levy it locally if the scheme gave only
- 14. Q. In these eases, where irrigation would only be 14. Q. In these ease, where irrigation would only he taken at intervals of a few years, do you think that would be a prefeable way of raising Government revenue to a water-rate on the area?—If you had proper control over the water and a definite scheme, I would prefer a water-rate on the area, lovying so much on the water taken; hut if oet, I would prefer a cess on the whole district—every man would benefit. It must be a small sess of course.
- 15. Q. What should the meximum he?-Half an anna on the rupes to hegin with.
- on the rupes to negin with.

  10. Q. (Mr. Muir-Mackenzie.)—With regard to the s-verity of the finine, I see an enurmous difference in these figures that are given here as regards the numbers an relief in 1873-74 and 1896 97. For instance, in Durbhangs, the numbers on relief in 1873-74 was 55 million and in 1896 97 the figure was 22½ million. Was the famine of 1896-97 as severe as that of 1873-74?—I could not say. Plenters who were present at both any they were of equel assertive. severity.
- 17. Q As regards failure of crops ?-The feiture of crops was more severe in 1896 97
- 18. Q. Hes the opening up of the country by railways and greater facilities of communication made any great difference?—I think it has made a great deal of difference in the resisting power of the people.
- 10. Q. Can we take it that you ere not likely to heve a mans severe formire than you bed in 1898-97?—I think it is pessible you coold have a more severe famins if you had three successive had years.
- 20. Q. liave three bad years in succession over been known in the district ?-I den't think so.
- 21. Q. (The President.)—I suppose prices never rose in 1898-97 to the 1573-74 mics?—No The increase was not so great. The average prices ere new so much higher.
- 23. Q. (Mr. Muir-Mackenzie.)—In the fomice pre-gramme paper we are given proportions of the population for whom work is provided for each district. Are yeu entis-fied that their proportions are properly adjoiled to the requirements of each district? I find that I Muzaffarpur work was previded for 80,412 persons, and the average number employed in the famine of 1996-97 was 31,424?—I think the number provided for might have been lessened

- 23. Q. In Durbhanga also the number provided for is 23. Q. In Durbhanga also the number provided for is 176,830, whereas the number employed only works out to \$2,461. Again in Chemparan provision is made for 177,229 persons and the average namber in the famine was 68,685 full persons and the sverage namber in the famine was 68,685 full persons and the sverage namber in the famine was 68,685 full persons and the work would be wascaded out eventually. The idea is to leave a lerge margia.
- 24. Q. I suppose the ideal to aim at is to have no work that is not useful?—Yes I would even go to the extent of taking men away a considerable distance for good works. I would seerifie more to the importonce of the work.

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- 25. Q. You don't think it is impracticable to convey people abent in this way?—No; in this district yen could take the cream of the labour away. The real labouring class are the first to rome on relief; these men are accustomed to travel about. That would leave small works to be carried and the influence of the contract of the contr out by inferior labour.
- 20. Q. Would you say that it is preferable to have large and extensive works and run the risk of people being on them whe did not require relief?—I would simply bring the people together, presuming that the work was accessary.
- 27. Q. I anderstend yen to wish to take edvantage of your good time to prepore a complete survey of useful works P-Ye- for such works as the Collector is not an expert upen; he knews reads, het net ennels.
- 28. Q. You want, if necessary to have the nid of professionel skill through the Public Works Dopartment for the purpose?—Yes, not only for relief purposes, but becouse I would like to take a few np in advance.
- 29. Q. Would yea like to see the Seran Causi works undertaken by the District Board?—I du not care who has the centrol, so long as the local officer has fall control and is not required to refer to Colcuttant erilical times. If there is to be a cess, whalever the proceeds they should be honded over to the District Beard.
- Mr. Allen explained that the law was an obstacle ia such a case.
- (Witness.) Where we have got to legislate for collecting the cess, we might as well by executive order prevent the District Beard spending its present cess on irrigation.
- 30. Q. (Mr. Muir-Meckenzie.)—Some of the planters mentioned that the District Board had lospend periodically large sums on relief works; has that actually been the case?—No, but Government has power to lasist en every penny golag to relief works. Sir Charles Elliott insisted on it in 1892, but Sir Alexander Meckenzie let them
- 31. Q. I understand the Beard slarle a work when famine is expected; have any substantial sums heen spent to that way?—In Murassarpur we spout something more than a lakh. I canaet remember the exect amount.
- 32. Q The District Boards seem to be lisble in years of moderate sesseity to be called uson to provide work which it might not want simply on the obsuce of people wanting relief?—Yes.
- 33. Q 1 there eny way of getting at the actual sams speat?—I think I can get thom for you.
- 31. Q. Has the Local Benrd always to set apart a sum on occurnt of this danger?—No, not nuless the warning note is given.
- 95. Q. In Shahabad I think you enid thore is no doubt of the necessity for irrigation 1s there any doubt that water will be taken?—In that I must trust the local mea. I think it will be taken. I did not go into the question, as I was teld that no reservoir was possible.
- 36. Q. De yea think they would pay the Sene Canel retes?—Yes.
- 37. Q. At oner?-Yes, I think so; they would not take n greet quantity of weter at first.
- 33. Q. I observe from the famine map that newbere through the enb-division was relief extended to more than eix per cent. of the population; is that not a sign that distress is never very intense?—They always live poorly. Every year they go away to get their living, not only in femins yeers.
- 39. Q. If the Karamnassa scheme is impossible, is there nny chance of saving the econtry by the extension of small works?—Yes, there are other schemes which might he gone into like the Dorgneti. Something could be dead also with pains and cuts into law lands.
- 40. Q. For the Gye District I understand there is no large work?—Ne; 'if there is a proper survey, I have no deabt a good deal of work could be found. large work?

41. Q. Some of the pains appear to be large works; would it be worth while to have the country anaveyed and put nader Government management?—The question of Government's interference must come up if the estates are subdivided mere and mure.

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- 42. Q. Do you support Mr. Oldham in his proposals on that point?—Yes.
- 43. Q. Do you support his proposal that the Collector should have the power to compel zamiudars to earry out repnirs?—Yes.
- 44. Q. For small chars as well as small bunds?—I should not use it if I was Collector unless the Executive Engineer said it was necessary.
- 45. Q. Would you give him an inspecting officer P.—Yes, I think that is necessary, because a Collector with the best intentions might do harm in pushing schemes which he thought good, but which really were not good.
- 46. Q. Would you like him in the case of pains to act in anticipation of complaint?—He would act on the complaint of the Inspecting Officer.
- 47. Q. I mean complaint on the part of the people?—I don't think that would ever happen.
- 49. Q. If the Collector is given this power, would he have in proceed aften to extreme?—No, not aften, but to give him the power which would serre a useful purpose.
- 49. Q. Do you think in a district like Gyn, with a let af complicated rights in water, it would be possible to have a record-of-rights P-I would have a record of the facts.
- 50. Q. You would not determine the rights?—No, I would allow the Collector to give an ad interim order; he might state the case and then it should go before the Civil Courts. There are some disputes he could not decide.
- 61. Q. Would it not be advisable for the proper husbanding of the water that the Collecter should by down how the stream should be divided?—I should not allow him to do more than pass temporary orders. He can determine all the facts but not the effects of the facts. I would not allow him to make a record-of-rights.
- 62. Q. l'atna, I understand, we may consider to be immune from fumine?—I do not think we can say that everything possible has been done. If the Collector were assisted by expert advice, he could got a great deal done by the people themselves.
- 53. Q. To recur to the question of a record-of-rights, in cases where a right of water has been made out and the existence of each a right obstructs the administration of the atream to the best advantage of the public in general, would you advocate that Government should have power to require the rights in that water, just as it can now acquire rights in land?—Yes, where a man had already a verted right, Government neight acquire a right to the balance over and abore what the insa could fairly apprapriate.
- 54. Q. If n man were obstructive, why should not his rights be taken away altogether P—That would be very expensive.
- 55. Q Nat necessarily more expensive than rights in land. You would give the man compensation for the appropriation and the value of the rights!—I would reserve to him all you possibly could consistently with using the stream to the best advantage.
- 50. Q. Regarding the repairs of pains and alars and other small irrigation works, is it generally the duty of the zamindar to repair P-That is the theory no doubt.
- 57. Q Has it been necepted by the Courts ?-I cannot say; I do not know of any case where the rayats have sought to get it enforced.
- 58. Q. Would the rumindars generally accept it if it came to putting it down in the record-of-rights?—Some would and some would not.
- 59. Q. Would it be safe generally to record it as the duty of zamindar? Yes, though they have shirked it a great deal.
- . 60. Q. Are there any daties on the part of the rayats in customary labour f-Yes.
- 61. Q. In Gya we heard of the gohan, a levy of lobour in cases of emergency. Is that the limit?—As far as I know, it is. I do not know the Gya District very much.
- 62. Q. Is that confined to the Gya District ?-There is, I think, something of the kind in Patun.
- G3. Q. In Saran in the famine I notice that the average number on relief for 1890-97 was only 14,000. That looks as if the famine must have been slight?—Yes. They belped themselves to a great extent by emigrating and sending back their money.

- 64. Q. Are there plenty of ontlets for that emigration?—The men went ent in large numbers, but did not all succeed in getting work.
- 65. Q. Have you been able to form any opinion as to the chance of geiting anything like a hundred thousand acres under the Saran Canal P.—No.
- 63. Q. Is there any reason to suppose that, before the embankment was made and when the channels were allowed to do their duty unimpeded, there was anything like that area under irrigation?—The cultivation must have been very different in those days. There most have been constant fleeds.
- 67. Q. There are no remains of any works of chars or pains?—No.
- 63. Q. (The President.)—They were devastating fleeds, I suppose P I understand so.
- 69. Q. (Mr. Muir-Mackenzie.)—Is there any reason to suppose that these embandments have really out off a very large amount of irrigation?—It has altered the nature of the country. There are no floods now.
- 70. Q. Were the floods useful? -Of course they strengthened the ground, but the people often lost their crops.
  - 71. Q. Did they bring down silt ?-Yes.
- 72 Q. In other parts of the country semetimes the flooded land is the only land where there is crop in time of famine. There is a considerable amount of well irrigation in parts of Suran P-Yes.
- 73. Q. 1s there any chance of a material extension?—I should think so, very considerable.
- 74. Q. What measures would you propose f-I would encourage rajats to take advances. A good many zamindars are rayats themselves with small heldings.
- 75. Q. To go to Champaran, when the Tribeni Caual is being made; will that fully protect the district P—It will make an enormous difference, but there was very large reliof given outside the Tribeni area.
- 70. Q. There will no doubt be a movement into the Tribeni tract during a famine?—Certainly I find that the effect of a canal extends to a considerable distance beyond the area actually covered by the canal. It means a great deal that within the canal tract all charity is not cut off.
- 77. Q. If you cannot say confidently that it will be a complete protection, it will be a very large measure of protection?—Yes.
- 78. Q. Do you feel confident that the people in Champaran will lake the Tribeni water in an ordinary year ?—I do not think there is enough cultivation to take it all at present, but the enlitvation will extend. The question is—when it does extend will the health of the district improve? At present the Saran mee, although they are so crawded, are very movilling to go up there. There must be a great deal of immigration from semewhere before the whole area can be taken up.
- 79. Q. There are considerable areas of waste and the country is annealthy?-Yes.
- 80. Q. Is water wanted very often there?—They cannot oultivate the whole of their holdings without it oven in ordinary years.
- 81. Q. Does Champaran differ very much from Muzastarpar and Durbinaga in that respect as regards minfall and the necessity of water?—Yes, but not very much. If it was cultivated, it would be much the same.
- 82. Q. We understand that in Marassarpur and Darbhauga the water is not wanted more than once in four years P—They would want it mere in Champaran. Northern Murassarpur and Northern Durbhanga do not depend ectirely on the rainfall. They get an enormous amount from floods and the overspill of the rivers. We have not had famine or scarcity there when, necording to the rainfall, we ought to have had one or the other.
- 83. Q. You would say that Champaran is more liable to scarcily than Durkhanga and Northern Mazaffarpur?—It is less protected by spill water, but the population is so small that they generally get enough to live on.
- 84. Q. According to the map there is quite as much distressed area in Durbhangs as in Champaran. There is hardly any dark-red area in Champaran?—It depends on the percentage of population relieved.
- 85. Q. What I want is to get at the grounds for the belief that water will be taken there and not taken lower down?—They are not provided for at present in Champunn; the rainfull is not sufficient there, and is fairly sufficient in

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Mr. L. Hare. the other two districts. I do not think the spill water in Champuran counts as much for the district as in the north of Muzasiarpur and Durbbanga.

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86. Q. The large schemes for Muzaffarpur are not then very promising?—No.

87. Q. Would it not be advisable to usk that the feasibility of taking the Tribeni even further should be considered?—You cannot cross the Bagmuti with the Tribeni Cond.

- 89. Q. (Sir Thomas Higham.)—It would be an nunccessary expense. If you go into the Beginati, you will have to put up a weir; and if you make u weir, you can get enough water from the Bagmati itself. We must draw a line somewhere. I think it would be well tog up to the liegmati. It looks as if tha area to be protected by irrigation in Muzaffarpur is small?—By any hig saheme, yes.
- 89. Q. Do you think small schemes could coror a considerable percentage of the areo?—What I should like to know is whether the water can be brought into the chaure earlier in the year In anticipation of a possible failure of the rains. Take the Baya river. The spills from the Gandak river filled all the chaure and these gave off their supply to the Baya all through the year. The planters agreed it would be good to close the old breach and put a sluice in, and now they are of opinion that they have made a mistake; their many hos not only boon lost, but mischievously speat. Lot these schemes be locked into and see if we cannot do something to seeure water being brought in earlier in the year in case there may be a failure in that year.
- 90. Q. (Mr. Muir-Mackenzie.)—And something similar might be done in Durbbanga?—A good deel is the sadr sub-division especially.
- 91. Q. All these schemes seem to me to protect urens outside the eadr sub-division of Dorbhaga in which there was most distress?—There is an onormous orea of chaur sadr sub-division that was very dry.
- 92. Q. You hope that might be helped by some such scheme as you suggest?—Yes, by letting the water in the chaurs earlier in the year when the rivers are high.
- 93. Q. If water was put into the chapts earlier in the year and you had heavy rain afterwards, would the country be seriously damaged?—Not seriously, but there would be some injary. I do not look upon floods as a very serious injury on the whole. They are not very violent.
- 91. Q. Do you know the works which Mr. King constructed for the Muharaja in Durbhanga?—Not very well.
- 95. Q. You agree in the general opinion os to their great nectulnes and efficiency f-I accopt that.
- 90. Q. Is there any chance of the unterial extension of well irrigation in these three districts of Champaran, Muzastarpur and Durbhanga?—It is dillicult to say.
- 97. Q. Why is it not more extended than it is at present?—The pererty of the rayat and his unwillingness to incar a risk.
- 98. Q. There is no unsuitability of sail?—Not generally. It is not much good a man having a well if he has no labour to work it.
- 99. Q. You do not think there is room for covering the country with as many wells as the lest part of Samu has?—No. The soll is more suitable in Samu and there is more labour there.
  - 100. Q. Investigation is wanted !- Yes, distinctly.
- 101. Q. It would be a mistake to abanden hope of exteeded well irrigation without going more into the subject?—Yes.
- 102. Q. As to advances for laud improvement, you actually gave bounties for kachcha wells during this famine ?— Yes, about a rupes a well; they cost about two rupess. They coverd a good area in Sitamurhi, but not much elewhere.
- 103. Q. Would you give bounties for the construction of pakka wells in ordinary times? That has been seriously put before us?—I would if it were proved that they would be very useful in a particular park.
- 101. Q. The Opium Department apparently advance money without interest. Would you go so far as that f—I would not minil going so far as that if the survey showed that it was desimble as a good field for extension.
- 105. Q. Are you satisfied with the present system for the distribution of advances?—The Collector could do a good deal more if he knew his ground; if he were entistied that it would be a good thing to make a well in a particular place, I should always be cautious of pushing an improvement unless I was sure it would be a good investment for the man himself.

- 100. Q. But supposing the Collector wished to push indivances, could he not do it more effectively with a change in the system?—I think the present system serves well enough. There is no doubt a little obstruction, but it is very easily get over. The rayat won't take Lond Improvement money; he will Agrianitural Loans money. If he is going to give Rs. 200 for a well, he must be a substantial mon; that is, practically a ramindar.
- 107. Q. Wenld he not take advance for improvements if the lean were spread over a longer period?—That would mean continual respeciability, but it would be a help certainly. It is not so much the system that is at foult; it is the number of small men.
- 108. Q. In Bombay and in Madras not only the Sabdivisional Officers but the Tahsildurs ure empowered to grant advances?—I think they might be given power to make enquiries, but they should get the order of the Collector before making payment.
- 109. Q. Is It necessary to have the Collector's sanction?—You would lose a lot of money if you did not.
- 110. Q. In Bembay we have not lost the money. I do not say that it has not been used for other purposes. As a general rule, it is recovered without any sert of difficulty?—In the furnine we gave a rounsion of one-third for land insprovement works, and there was very little taken—under half a lake.
- 111. Q. Very much larger remissions were made in Bombay Presidency. There and in Madras remission of a hulf was premised in many cases. Could not the power go lower—to the Sab-Dopaty Collector?—He is generally in chorge of the treasury. We have only two men in the sub-division—the Sab-divisional Officer and the Sub-Dopaty Collector. We could put on a kannange. We used to necest his report in tha famine and he gave the mency out at once. But the real difficulty is the went of substantial mon willing to iccur the responsibility of taking an advance.
- 112. Q. The Opium Department succeeded in getting rid of a certain amount of advances for wells? Not a very large amount.
- 113. Q. Still it is larger than has been done oatside the department; is it not?—Yes.
- 114 Q. The Opium Department have adopted the principle of getting the poor people to combine. Could not you do the same?—It would be possible, but very difficult. In the case of the opium advances they are probably all taken by opium men and it is taken eventually out of the opium payments; and the man at the head of a gang has a good deal of contral over it. They are all practically combined in the oplum business.
- 115. Q. In the southere part of the Bembay Presidency all these things were said, but there happened to come a Collector who took up the subject very mach in earnest, and the advances immediately accreased enormously; and in Coimbatore, Madras, the raine thing happened; it is difficult not to hope that something more may be done by individual initiative. We got up from a few thousands a year to over a lakb?—Yes, I think a lakb could soon be got rid of here.
- 116. Q. (Mr. Rajaratna Mudaliar.)—Does the foar of enhancement of nee-sment by the zamindar doter them for No. Besides the man who tack it here would be nearly always more or less a zamindar. I do not think the tenant would be alraid of enhoncement where there is a record-of-rights.
- 117. Q. Where there is no record the fear does exist, I sappose?—I think so.
- 118. Q. In preparing your famino relief programme were you not guided by the circelar of the Government of India, saying that you should provide for relief for 20 per cent of the population for three months?—In preparing our famine pregrammae we put down every work we know of that could be of any use, and if it came to a bigger list than was octually required, so much the better.
- 119. Q. In 1896-97 over 362 lakks were spent in Durbhanga District on famine rellef. Gould you kindly tell us what portlea of it was spent on irrigation works ?—I could not; but I should say extremely little—next to nothing.
- 120. Q. Is the condition of the pains generally so had os to call for legislation to enforce upon the zamindar the duty of maintaining them in proper order?—Not generally. It is not so much that. It is the breaking up of the estate. It is more and more difficult to get thom all to ugree. One man stands out and blocks the improvement.
- 121. Q. So legislation is now more necessary than it was formerly?—It is growing more necessary, but not urgoutly necessary.

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- 122. Q. (Ar. Muir Makenzie:)—Mr. Oldhum seemed to consider it argently necessary in Gya?—Lagrecus to its desirability, but I do not think that the question is so pressing as Mr. Oldham says. Alr. Oldham, however, knowe more than I do about that district.
- 123. Q. (Mr. Rajaratna Mudaliar.)—Does the zamindar levy contribution from the teaants towards the maintenance of these pains or akars in Durbhanga P—No.
- 124. Q.. Where a pain is constructed by a zamindar at his cost, if the cost of maintenance is thrown on him, would you not let him lovy a cas to cover the maintenance charges P—I do not think it necessary:
- 125. Q. Do you think that the introduction of differential water-rates would be useful; that is, with reference to the facilities for water-supply and the suitability of the soil for irrigation?—Some lands in the lower reaches would not get the full benefit of irrigation, and uniform rate of cess will fall more heavily in one place than another?—It is theresteally sound enough; but it depends on the nature of the scheme.

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- · 126. Q. Will you not be able to realize a higher revenue if you adopt a system of differential rates?—No doubt, if you press for it in places where the water is very much wanted. I do not see why you should not obarge as much as they will pay.
- 127. Q. In Madras and Bombay we have consolidated assessments ranging from three to twelve rupees. There we differentiate between the quantity supplied and the quality of the soil. Under a system of uniform water-rate that is not possible?—Whore you have a consolidated assessment, it is quite sound to make differences. But if you are simply charging for water supplied, you must charge the same price.
- 123. Q. Say a canal is 10 miles long. Why, should not you have a higher rate at the upper 5 miles and a lower rate at the lower 5 miles to get a larger revenue and make the incidence fair?—In the Sane Canal system you might charge more in certain areas where it might be herne, but I do not think there is may necessity for it.
- 129. Q. (Mr. Muir-Mackenzie.)—The rato for the Sono Canal could, without sny impropriety, he raised?—I think you ought to recover your expenditure, and if it he uccessary, to raise the rate to do so. It would be fair to raise it, but I should like tweet it kept as low as possible. I do not think you should charge all you canget. I should raise the rate very gradually up to the real value of the water.
- 180. Q. (Mr. Rajarata Mudaliar.)—Do you think that any economy could be offected by entrusting the work of measuring and assessing and collecting to one and the same staff?—I have not had enough detailed experience to say.
- 191. Q. Do you see any serious objection to such an arrangement. The cost of the collecting stoff comes to 5t annas per acre?—I don't think you could make any large reduction.
- 132. Q: (Mr. Allen)—Your records of rights of water would include the record of any rights that might exist as to using the pain on particular days?—That would be one thing; and the length of time a bund is allowed to stand sliculd also be recorded.
- 133. Q. If n water cess were imposed in the Saran District, would you exclude any lands which would not in ordinary years be benefited or those which would nover be benefited by irrigation through those causls ?—It would depend on the scheme. If any very large area was not benefited, I should exclude it.
- 136. Q: In this district, where there are schemes for krigating a strip on the north side, do you think unything like a water east can be imposed?—I would put it on the local area, something like the Draiange Act cess, except that I would leave out the provision in that Act under which you must got a majority of the people to agree. Let the Government lay it down; we shall get nothing done if payment is entirely optional. We are justified in compelling a tract of country to protect itself.
- 135. Q. You would have a compulsory lovy instead of an optional charge?—Yes.
- 136. Q. In preference to a water-rate?—Yes: The expense of such a scheme would be small compared with the expense of a scheme where you have a water-rate.
- 187. Q. Would you impose a water-rate for water netnally used as well as a cess?—I would make three stages—one where the scheme affected the whole district, one where it was carried over a very limited area, and one whore it was in the mature of a complete system like the Sone Canal

- system. In the second case I would charge a small case every year on the ground covered and also for the water. The water-rate would be the main thing, and I would liope gradually to drop the case.
- 138. Q. With regard to Mr. Oldham's proposals for special legislation for dispates about water, would that be something supplementary to the Crimtonl Procedure Code?—Yes; whether there be a breach of the peace imminute or not he should have power to ducide in eases of dispates or to take fiduciary possession of the works and to administer and maintain thom.
- 130. Q. Would'it not be difficult to word a law of that kind?—It would be difficult. It is in accordation with what I proposed for Eestern Bougal. The zamindars entirely accopted the priociple of that proposal. We have enormous churs there which they are always lighting over; they asked that the Collecter should also possession of any disputed chur and, if necessary, managerit until he had decided who was entitled to it. A chur is an island thrown up in the river and new allowal accretions.
- 140. Q. With regard to the two Leans Acts, the Beard's rules for the Land Improvements Leans Act do not nutherise the Collector to delegate his power for distribution of leans to a Sub-divisional Ollicer. Do you think that such a rule would be useful?—I do not think that there would be very much use in it. To us Rs. 200 is a large sum. At the same time there is no harm in the ease going to the Collector for approval; the delay is not so great as to he soriess.
- 141. Q. With regard to the Agricultural Lonas Act, the promble to the rules disconnages the grant of loans under that Act except to very needy cultivators. Is that a useful pressable? Is that the right spirit in which the loans should be given?—I am afraid it is not. These loans are not of much use except in actual searcity.
- 142. Q. (Mr. Muir-Mackenzie.)—Would you think it advisable to begin with a cess within the Triboni area?—No, it is not necessary.
- 143 Q. (Sir Thomas Higham)—Aboat your proposed oces I understand you propose that, in any district in which the demand is very irregular and where water is only required, perhaps once in four or five years, a cess shall be charged on all the area protected in addition to whatever charge may be made in the form of a water-rate?—Yes. If you have a complete causel system is which you can determine to what-place the water can go.
- 144. Q. That cess would be leviable only on that particular tract-that can be entered by the canal ?—Yes.
- 145: Q. You say you would levy direct from occupiers' along with the demands for water supplied in the same manner in which they take water, you would levy the water rate?—
  No, I would charge them for the water supplied, and they would pay their cess too. It would be fixed on a five years' calculation.
- 140. Q. The water-rate would be paid by the occupier ?-
- 147. Q. He would pay his water-rate if he took water, and a certain charge on the area protected?—Yes.
- 148. Q. (Alr. Muir Mackenzie.) Would be also pay thoses &- I would call it an insurance fee.
- 149. Q. Do you wish both to be paid by the occupier? ... Yes. In the case of a complete canal system.
- 150. Q. I understood the cose was to be paid by the ramindar?—Where you have a general cess, as I would in the Saran District, you will have to take it from the ramindar.
- 151. Q. (Mr. Allen.)—In the case of a complete canalistation would you collect your cess from every myst?—Yes, on the basis of the canal papers—simply a compulsory permanent lease.
- 152. Q. (Sir Thomas Migham.)—The cess to be so regulated as to give reasonable interest to cover the cost of maintenance. You would not call 4 per cent unreasonable interest?—I should like you to put it lower probably, but I should like to be told the scheme and the probable beaufit.
- 153. Q. Even when that domand is assured as on the Sone, there is very little prospect of tonching 4 per cent. I do not see how we can get it on a system where the demand is very irregular. But "reasonable" might be anything you like?—In Saran it was proposed to put a cess on the whole district like the present road cess and to have no water-rates at all and no charges for water. The general opinion is that it would be accepted.

Mr. L. Haro.

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- 154. Q. Would it be possible to pat on a cass like that as part of the embankment coss?—You would have to amend the Elobankmeat Act. You must legislate, because we have just mude a tweaty years' agreement for this embankment.
- 155. Q. The emhankment cess is payable by the zamiadars only?—Yes, a psicentogo on the land revenue. The road cess is a percentage on the rout receipts of the estate.
- 150. Q. If you made these canals and put on an irrigation as, would that be chargeable on the revenue or on the at he chargeable on the revenue or on the rental !- On the rental.
- 167. Q. That is to say, half would be recoverable from the landlord and half from the cultivator. For that you would require a special Act?-Yes.
- 158. Q. That would involve control by the District Board? -Not necessarily. You one put the control under an body you like; but I think that the Board might take it up. In any case the man on the epot must have ample power and not have to refer to anybody. The District Eugineer has great local knowledge and covers the greand.
- 159. Q. (The President.) We sheald be glad to know 169. Q. (The President.)—We should be glad to know if you have any saggestions you can give us?—I should strongly arge that too summent should supply as a man to each district, but principally in the northern districts, to make a first or preliminary examination into all possible schemes that may be put forward and to prepare detailed estimates for premising schemes. We could then say that such and each schemes are so beneficial that we should be justified in latint account of the present of the premising schemes. fied in legi-loting to secure the monoy to enable them to be carried out. I do not in the least expect that Government should incur ali the coet, but I think it must give help.

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160. Q. (Mr. Muir-Mackenzie.)-Who would decide ss to the value of the schemes, the Collector or the Government f-The professional expert of the Government In many cases, where it would not be justifiable to levy a cess, the echomes might be held over to be taken up in a famine. In Bhabua there are many works of that surt that could be done, opening cuts into chaurs from the rivers to secare the water when floods come, etc.

## SEVENTH DAY.

## Purulia, 3rd November 1902.

WITNESS No. 52 .- ME. F. T. LYALL, Deputy Commissioner, Palemau.

- Mr. 1. Q. (The President.)—You are Depaty Commissioner F. T. Lyall. of Palamau, I understand?—Yes.
- 2 Q How long have you been there? I went there a the 11th of December and have lately been on three 3 Nov. 02. menthe leave.
  - 3. Q. Had you before been in Chota Nagpur !- No.
  - 4. Q. You have been about the district and know it well?—Yes, a good deal. I have spent about five or six months on toar.
  - Q. I believe the population is comparatively small?

    —Yes, and very scattered; 120 to the square mile.
  - 0. Q. You say in answer to question No. 4" the rainfall is so precarious in this district that almost all the mile so precared in this district that admost all the bhadoi rice crops being excepted. The normal neas of the winter rice crop is this district is 277,900 acres. Then typic per esat, of the rabi crops of the district requires artificial irrigation. ?—These replies were submitted before I retarned from leave; they are not obsolutely correct.
  - 7. Q. You say is answer to question No. 1 that the average gross orea annually eropped is 735,600 acres, and you go on to say is question No. 4 that "the normal area under rabi food crops is 181,500 acres." Rubi ie a lorge proportion ?-Yes, 25 per cent. is rabi.
  - 8. Q. (Sir Thomas Higham)—The crop that requires irrigation chiefly is the nee?—The irrigotion required for rabi is shelly for the germination of grain and wheat. I think irrigation for rabi is of less importance than irrigation for rice; when the rice crop has failed they are inclined to not down archi.
  - Q. tThe President.) Do they got a better return out of this rice?—Yes, very much; an average crop in rice would yield 75 per cont. more than a rabi crop.
  - 10 Q. And it would be got with less trouble? Yes, I think 70 per cent. of the rabi is not open to irrigation and most of the rice is irrigated.
  - 11. Q. In answer to question No. 5-A you say "eince 1896-97 the lovel of prices in the gram market has remained very near the condition amounting to scarcity." That is for the last five years ?-Yes.
  - 12. Q Have the people at the present moment just got-their heads above water?—They were extremely badly off lost year. Government spent a quarter of a lake on embookments and repairs of ahars; several zamindars have spent a good deal also. I have not required relief works, as there are sotherent jungle products, such as mahua, so that the people are not so dependent on coreals as they are elsewhere.

- 13. Q. Last year you had good rain?—Yes, but it was extremely late; there was an opportune fall of rain on the 20th of September which waved the situation, otherwise it would have been extremely precarious.
- 14. Q. In answer to question No. 8 year refer to reservoirs; I sappose these are very small?—Yes, they are very small. I don't think any reservoir would irrigate from its own water more than 50 to 100 bighas; in some cases where streams are diverted they irrigate more.
  - 15. Q. Is a reservoir and ahar the same thing?-Yes.
  - 16. Q. How much is a bigha?- f of an acre.
- 16. Q. How much is a bigha?—t of an acro.

  17. Q. In answer to question No. 9 yon say "a programme should be drawn up for each village or group of villages where irrigation work is needed through the agency of the Tahalldars in Government estates and of the proprietors in private estates." You don't contemplate any large irrigation works?—I should be very glad to see some of these eckemes which the Public Works Department have dealt with, curried out. I am inclined to doubt the criticisms made as to the poor financial prospects of the schemes. I think they would pay.

  18. Q. Mr. Maconalty, referring to the Nadars scheme.
- 18 Q. Mr. Maconchy, referring to the Nadaara scheme, same up his report as follows:—" The weak point of this scheme is the inadequacy of the source of supply, the calchment hasin being so small and so close to calchment has being so small and so close to the cemmanded area. There is almost a certainty of failare of supply in years when it is nost wanted, and the aumher of years in which the supply-would be both available and asseful is too small in allow of the scheme being looked on as a desirable one for Government to carry out. It would in any case be worked at a loss, which its lack aft real utility would not justify." Do you agree with that P—I don't think that criticism is just; 1873 and 1899 were the only years in which the reinfoll was not sufficient to make the scheme a success: and it is very soldem indeed that the extra water would not be useful.
- 19. Q. You think Mr. Maconchy takes too despondent a view of the scheme?—I think so; besides there are some difficulties in the way of his criticoloing the scheme; the chief is hie want of knowledge with regard to the system of tenure of land. In ordinary Bengal districts the only wey you can get n return is in the shape of a water cosa; in our district the land is entirely zamindari and subanced reats can be got; the zamindars, if they earry out a scheme, are entitled to got entire benefits from the rayats.
- 20. Q. (Mr. Muir-Mackenzie.)—Are they cash reats? Yes, in the majority of instances.
- 21. Q. (The President.)—Would you like to see the Nodaura retieme carried out at once or reserved as a famine rollef work ?—At once. We have estimates in the Civil Department is which the cost came to only Rs. 10,000. I

have worked out the figuree on that basis, and I think Government would be reimbursed for the onthry. I don't know on what basis this estimate of Rs. 77,000 of the Public Works Department is based.

22. Q. It mass be a bigger scheme than years, I foncy?
—Yes, there are four or five distributary chouncils, while ours had only two.

23. Q. The area commanded is only 5,375 acros?—Yes; it is impossible to get a large scheme in Pulamna.

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Mr. Horn.—These schemes were worked out in detail 25 years ago; there are plane and estimates in the Superintending Engineer's office. Mr. Maconchy brought them up to date.

24. Q. (The President.)—In your answer to question No. IO (a) you give the amounts of Government loans advanced during the past six years under the Lond Improvement Act. What are they generally takes for ?—Porely and simply for irrigation works.

25. Q. For making bunds, etc. !-- Yes, and for dams

26. Q. Could yan have spent more money if you had liked?—Yee, I think the zaminons were not aware that Government was prepared to make such large advances. In 1897 they wore very grateful for the money given and said it would be a source of great profit to them.

27. Q. In Bihar and elsewhere we have found no particular keenness about beans and a good deal of complaint about the circumfoentian; could it be made easier do you think?—I think it could be made distinctly easier in regulation districts; this is a harkward district and the conditions of Palumou are somewhat different. The mechinery requires a little oiling:

28. Q. The rate, I suppose, is 61 per cent.?-Yes.

29. Q. Does the rayat object to that part of it; would he like to have a reduction f.—No; he objects to the trouble of coming in to the Kochheri and to the enquiries that are usually made.

30. Q. Have you Sub-divisional Officers?-Ko.

31. Q. Is there anyone but yourself who can grant advances?—No; it is all done under my signature.

32. Q. You say in reply to question No. 10 (c), referring to the extension of private originion works—"their construction may be oncouraged by free advances or Government loans." Do you mean without interest at all P—Ac. What is meant is that they should be freely given.

33. Q. (Mr. Mair-Mackenzia.)—You don't mean grantsin-aid?—Ao; I think that would be fatal. The benefits are so very high. The improvements effected often yield as much as 75 per cent, interest in the shape of increased orition.

34. Q. (The President.)—You have a permanent settlement? - Yes.

35. Q. That is not usual in Chota Nagpur?—I am not aware. In my district it is the result of elemency of the Gavenament. Originally the entire district was the properly of the Polomul Raja; he gave out his land to jagirdam and collected rents in return for services on the estale; when the Raj was sold up far arrears of Government resource, all the jagirdam held the same position in respect of Government that they had held with the Raja. Government, instead of adhering to all the conditions and resuming the estates on failure of the male line, has given them permanent occupancy rights.

36. Q. You say in reply to question No. 11 (4), referring to wells, it is very desirable to stimulate their construction?—That will have very little effect on any famine question; it refers to vegetables.

37. Q. Not to rice?—No, nor wheat; it is only wanted for crops near villages—sugmenne and tobacco; sugarcane is very important.

38. Q. Have you as much money as you would like to give in takavi?—I think that Government is perfectly propared to be liberal in the matter and will give as mach as I would like; every year we are saked for an estimate of our requirements and the amount advanced depends on that.

39. Q. Is it worth while to stimulate it ? - Yes, certainly. There is nothing that will bound the district so greatly or do more towards warding off bad seasons and famine.

40. Q. In 1897-98 you had a respectable sum and it hose gone down to its. 3,000 this year?—Yes, that is because we have not tried to make the ramindars take the advances; in familie years we did try to do so.

41. Q. You hope to do so?—Yes, I want to. They are Mr. fully slive to the benefits of irrigation, but have not the F. T. Lyatl. capital to carry it out.

42 Q. What style of famine works have yea in this district?—They are chiefly irrigation bunds and 'chars'; many have been started and left, incomplete; their maintenance has been neglected; formerly in the Gavernment estates there were tikeders to whom the villege wee let out in ront; they often took leaus for the coastruction of ahars, and during their tenure they were allowed to make all the profite they could. Now we have taken the whole thing under our own management and there is no such inducement.

43. Q. Do you expect to stay here long?—One or two years.

41. Q. (Sir Thomas Higham.)—With regard to your answer to question No. 1, what is the area irrigated by Government works?—The figures given rolats to rice lands below ahars on Government calates; these ahars are not, however, Government works. The figures given are extremely incorrect.

45. Q. The area is said to be for the whole district?—ties. This also is incorrect.

46. Q You say in answer to question Na. 4 "the rainfall is so precarious in this district that almost all the winter crops are dependent on nufficial irrigation." What you mean is that it is desirable they should have it?—Yes.

47. Q But they don't have netificial irrigation provided aways ?—Not always I think the proper answer is that, as a matter of fact, somewhere about 80,000 to 90,000 acres are actually capable of being irrigated and that though rice hads are not absolutely dependent on it, they are better for irrigation and that the outturn would be improved by it.

48. Q. Yousay, if there is a failure of rain before the mudle of September, adars are not used P-No, I den't soy so.

49. Q. Is there ever a failure of rain before the middle of Syntember?—There have been only two years of failure that I am aware of in the lost 30 years?

50 Q. Would not the abure always be filled by the beginning of September ?-1 think prebably they would.

51. Q By the end of September irrigation would be exhausted?-Yes.

52 Q. And there would be nothing left for October? -No.

63. Q. You say revious should be get out of zamindars, land, supposing Government unde irrigation works?— I don't think, under existing circumstances, we could get mything out of it. We have several large landelders who are distinctly good ramindars and who are ready to take loans for brighting work if it could be managed. I think they should be oncouraged to do the thing themselves.

51. Q. If Government unde works that would irrigate zamiudars' land, would they make their own channels!—I think so and they would pay a contribution towards the cost of any pakka massary for a woir.

55. Q. On Government lands would you look for a return in increased ront ?—Yes; also in collection of roats.

56. Q In how many years ?—to the unjority of cases as soon as the water came; there are other lands on which there would not be a return sooner than from three to five years.

57. Q. Why so long ?-The land is very neeven and would require termeing.

58. Q. Rent is not fixed for a definite term ?-Wo have n acttlement for 15 years.

59. Q. Could you misse reat before that ?—The Beard of Revenue lines decided that we could not; I think we could. If we were in a position to say to a man "by the expenditure of Rs. 1,000 on any irrigation work we will double the outturn of your land, will you pay a higher rent or go on as you are now," I think they would gladly agree to pay the higher rent.

60 Q. You are in favour of the Nadaura and other schemes being carried out?—Yes, very much.

ol. Q. Don't you think they would fail in years when they were most wanted !—No. I don't think so; they might fail one year 1u 30, but in the menatime they would have done so much good in improving the position of the temantry, landlerly, and Government that we should all be in a better position to withstand famine; that one year would not hit us so bard.

Mr. 62. Q. They would have to be in all cases worked by F. T. Lyall, means of filling ahars?—Yes.

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- 64. Q. Has there been any increase in the number of ahars in the last few years ?—Yes; before the 30 years sottlement there were in the Government entate only 190 and at the end of it 1,100.
- 65. Q. How long ngo was the settlement ?-It ended in 1896-97.
- 66. Q. Are they going on making ahars now ?-Yes; some were made in the famine of 1896-97 and some more in the famine of 1899-1900.
- 67. Q, Is that a regular part of your famine programmo?—It is the most important feeture in it.
- 68. Q. Havo you a programme of relief works now? -Yes.
- 69. Q. Had you relief worke lest year ?-No, in 1899-
- 70. Q. Is your programme complete now?—Yes, it is supposed to be. We have the names of villages where ahars are required and are to be repoired, but at the came time we have not got plene of the ahars that are to be made; as a rule, they are so small that plans and estimetes are not required.
- 71. Q. These ahars are to be made as relief works; are they in Government estates?—Mostly. Semetimes they are in private estates.
  - 72. Q. At the cost of Government?-Yes.
- 73. Q. If a man ceked for an akar, would you put reliaf labour there?—If it were absolutely required as a reliaf measure.
- 74. Q. Would be contribute anything !-No, not if it. were made in a famine year.
- 75. Q. You don't mind their heing made in that woy?

  —I don't think it is proper to make them in the villages of large zamindars who can afford to borrow the money to do the work themselves.
- 76. Q. How are eiter fixed; is anybody on the look-out for sites?—Yes, we have Tabeildars doing it. This is a matter I have taken up strongly; I have had a register prepared of existing ahars when repaired and the cost incurred; also of sites for new ahars.
  - 77. Q. On Government estateo ?-Yee.
- 78. Q. Not elsewhere?—No; we have to apply to the zamindars.
- 79. Q What proportion are Government estates of the whole?—One-tenth.
- 80. Q. (Afr. Muir-Mackenzie.) Have you any, difficulty in getting land out of zamindare for irrigetion works? — No, never.
- 81. Q. You don't pey anything for compensation?—No; possibly in one pergumeh we might have to; the circumstances there are different to the rest of the district.
- 82. Q. Woold you like to have a ourvey of the countrymade so as to fix good sites ?—For the lerger schemes it would be excellent, but not for the smaller ones.
- \$3. Q. It is quite easy to choose the sites?—Yes, they are very obvious indeed.
- §4. Q. Is this programme of yours based on the number of sites ulready fixed f—Yee.
- 85. Q. Who chooses the cites?—As n rule, it is the subordinate establishment, and during the cold weather I make it n point to look np these cites; I found in the past several had been very badly chosen and there has been n waste of money in consequence.
- 86. Q. If sites are not carefully designed, there is fear of whete?—Yes.
- 87. Q. Would it not be advisable to have a survey for sites P—I don't think it would repay you. The District Officer can go round end see tham.
  - 88. Q. Must the District Officer be the Collector ?- Yes.
- 80. Q. Could be, cover the whole district himself?-I think so; one cold weather is enough.
- 90. Q. From this paper issued by the Revenue Department it would appear that the demand for relief work is likely to be very small in your district?—Yes.
- 91. Q. Therefore you would not get very much in the course of the famine !—Very little.

- 92. Q. For real extensions of works you would have to rely on what?—Works undertaken by zamindars.
- 93. Q. Is there any room for more schemes for filling ahars from streams?—Yes, there is a good deal of room.
- 94. Q. Have you done anything of the kind?—I was met by nn nhsolute impasse from the Board of Revenue in the matter of the Nadaura scheme; they said nothing should he allowed during the enreency of the settlement nuless it would be shown to be locrative, while at the came time rents were not to be increased.
- 95. Q. There is absolutely in this district no chance of the people heing backward in taking water?—No, they howl for it.
- 96. Q. Will they pey for it?—Yes, in the shope of enhanced rent. They have often hogged me to moke ahars over their lands and take payment in the shape of enhanced rent.
- 97. Q. Is there any difficulty from the point of view of organization in making thess bunds as famine relief works?—Their being small and scattered, it is very difficult; it means en immense emount of lahour and expervision for the District Officer.
- 98. Q. Still it is not an insuperable difficulty?—No, you must have no energetic officer.
- 99. Q. There is no insuperable difficulty in getting establishment?—As e ruls, I should not have famine principles at all; let the work be done as piece-work.
- 100. Q. What is the principal feature of your tenure which enables a zeminder to get increased rent?—They are tenants-at-will. The Tocency Act is not in force.
- 101. Q. If a zamindar is able to got a substantial profit easily from the making of these, apparently, not very expensive improvements, how is it that he has not done so not ot be present?—He is a very beckword man, as a rule, and he has never heen taught very much. His expenses are heavy and he has not much epars capital at his command. The Nawa Government estate, which was under the Coart of Warde management, is an example of the benefits eccrning from irrigation. There was no enhancement of rate, although there was enhanced rent.
- 102. Q. Did they increase rent on account of improved classification?—Yes; 2nd cless became 1st. In 13 years the rent roll was increased from Rs. 12,861 to 18s. 26,170; the schedule of inter-was not altered.; the expenditure oairrigation was Rs. 11,557.
- 103. Q. That was done under the Court of Wards?—Yes.
- 104. Q. Since the Coort of Wards' time?—The further figures are not reliable, because they are gethered by native ageory. From the same estate we may, as an example, toke one work alone. The expenditure in the village of Nawa is put down at Rs. 1,000; the approximate area irrigated is 275 bighas; before the construction of the bund Rs. 1811 was got in the matter of rent, which has since heen forceased to ils. 250; in addition to that it is stated that from rise land which he cultivates for himself; they yield before was 450 maunds; now it is 3,500. It has increased in actual rent and outturn:

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- 105. Q. Yon say under the Board's orders you were powerless because you could not enhance the rent doring the period of settlement. You said also that rayste would be willing to occept enhancement if improvements were made for their henceit. Don't you think Government should have the legal power to enhance if they improved the water-copply?—Yes, most certainly; I put very great stress on that.
- 106. Q. To come to the distribution of udvances. Do you think the Collector does not require any more help in distributing advances? Would you he inclined to have certain powers delegated to some subordinate officers?—Yes, I' think so. I would not go as far as to delegate powers to the Tahsildar. I would not go below a Snb-Deputy Collector on Rs. 120 to Re. 150.
- 107. Q. How far would you allow him to go? A couple of hundred rupees.
- 103. Q. What period would you allow for the repayment of these advances?—I think for the large schemes certainly 30. yeers; there are no schemes in my district except the Nadaura that would require each a long period. For most of the schemes 20 years would be quite ample; for enything helow Rs. 5,000 ten years would be enough. Another point is the delay in the repayment of the first instalment, I would give the herrower two to three years at least,

bocause he gets no return for the first year or two, especially in Palaman, because of the time it takes to get your new rice lands ander, cultivation owing to difficulties in levelling and so on.

- 109. Q. The prospects of getting water is sufficient to induce the tenants to undertake the labour f—In most cases it is not. The zamindars often do the terracing and lovelling and then let out land on quit rent.
- 110. Q. Would advances have to cover the expenses of lovelling as well as expenses of bunds?—I don't think it would be absolutely necessary. If they require it, I would not hesitate to let them have it.

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- 111. Q. You seem to have no apprehension that you would get as much money as you required for advances; how much could you got through in n year P—The people would require a good deal of education; just now I could got through Rs. 50,000 to Rs. 1,00,000.
- . 112. Q. Have you much trouble in the working of the existing small irrigation works like ahars?—Very little.
- 113. Q. Is there my trouble from people entting bunds? -Very little so for, but my experience is not large.
- 114. Q. Have you a record-of-rights?-In Govornment estates there is ; nowhere else.
  - 116. Q. Have youn record-of-rights in water ?-No.
- 116. Q. Do you think it would be possible to have it?'Yes, but I do not think it is a burning question now.
- 117. Q. In this district disputes about water don't go into the Civil Courts?—Not much. There is one ease in which Government has lost the entire right to the water in a stream owing to the adverse decision of the Civil Courts; that is 30 years' old, and it has affected us pre-judicially; if it had been appealable, I should have appealed, I am considering whether Government should endeavour to secure rights therein somehow or other.
- 11d. Q. Whose business is it to repair the ahare?—In Government estates it is the duty of the Deputy Commissioner and his staff.
- 119. Q. And ou zamindar's estato?—The zamindar does it himself; unless there is a tikadar, then be does it.
- 120. Q. It is not the tenant's duty?-No; the touant is supposed to do nothing more than fill up rat-holes, oto., and other minor damage.
- 121. Q. Is any record-of-rights going to be introduced in zamiodar's estates?-That is not under discussion at
  - 122. Q. There is no occasion in this district for any special legislation?—Very little. There is another point; the slopes in the district are so great that the water is never long in reaching a big stream and many people's rights are not concerned.
  - 123. Q. If you make ahars, you have no apprehension of difficulty in getting them kept in repair?—No; they will require some inspection.
  - 124. Q. And on zomlndars' estates?-I don't think Government can inspect there.
  - 125. Q. How will you make them do their duty !-- I think they should be given loaus to construct their own.
  - 126. Q. Once having made them, it is important that the repairs should be kept up?—I think the feeling of self-interest will suffice. It is only themselves who are harmed if there is neglect. It is difficult to see how anything more is to be done. If you give a man money and he repays it, what more can you do in the matter? If you made the abars by Government agency, it would be a different thing. different thing.
  - 127. Q. You would not make it n condition in giving an advance that the thing should be kept in repair ?—It would be difficult to enforce such a condition. If a breach occurred, you could not say if it was due to neglect or any-
  - 128. Q. You think there is nothing for it but to leave it to the self-interest of the man?—Nothing, especially in the ease of the bigger zamindars.
  - 129. Q. Could there be any large extension of wells in the vicinity of villages?—Yes.
  - 180. Q. If advances were given with liberality for wells, would they take them? - They require education; some would take them, but not many.
  - 191. Q. Is there anything like the same demand as for bunds?—Nothing like it; this is greatly due to the rocky nature of the sub-soil and well-sinking is very difficult there.
- 132. Q. Still you would be glad to have money, in your bands for the purpose ?—Yes, certainly.

- 183. Q. Do you think the transfer of officers has led to any discontinuity of pelicy in such matters?—Yos.
- 184. Q. It is important to kosp a man who is interested in such things ?-Very important, especially in non-regula. 3 Nov. 02. tion districts.
- 135. Q. (Mr. Rajaratna Mudaliar.)—You said the Beard of Revenno's objection to enhancement of ront during the nurroncy of the settlement prevented your ontrying out certain irrigation works; on what grounds did they raise the objection?—I cannot say. The letter reads as follows:—
  "The Board are of opinion that there should be no enhancements of rents during the present sattlement whether the rayats are willing to accept the rayats are willing to accept the rayats are willing to accept the rayats are willing to accept the rayats are willing to accept the rayats are willing to accept the rayats are willing to accept the rayats are willing to accept the rayats are willing to accept the rayats are willing to accept the rayats are willing to accept the rayats are willing to accept the rayats are willing to accept the rayats are willing to accept the rayats are the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the rayats are represented to the repr
- 136. Q. Do you issue a notification during the time of actilement P-Yas.
- 137. Q. Could you not get over the difficulty by inserting a saving clause to the effect that during the entrency of the sattlement if works are constructed by Government there should be onlanced rent?—Yes, the Board have simply to say that they agree to it.
- 13S. Q. You said in one estate the classification was raised?—Yes.
- 130. Q. I suppose zamindars could also effect such onhancements if they carry out improvements ?—Yes.
- 140. Q. Harother carried out any improvements . Yes, they are absolutely unfettered.
- 141. Q. I am referring to occupancy tenants?-There are none except in Government estates, and in Government estates occupancy tenants have no powers of alienation.
- 142. Q. In Government estates I suppose lands which are assersed at lat class rates cannot be enhanced ?—I would not cubance them during the curroncy of sottlement; I think that would be a breach of faith.
- 143. Q. Could you onhance 2ad class to 1st class?—I don't think there would be my objection.
- 144. Q. Supposing it is unirrigated?—If rice land is unirrigated, it is 3rd class and would not be classed as let class.
- 145. Q. (The President.)-And if rabi land ?-It might be classed 1st class thon.
- 146. Q. (Mr. Rajaratna Mudaliar.)-Since 97 you have granted Rs. 63,020 in leans for 279 reservoirs. Do you happen to know what area has been benefited by those works?—No, but a large area must have been
- 147. Q. That was done ohiefly the femine relief?—Rs. 30,000 of that.
- 148. Q. Is the condition of these works fairly satisfuc-tory?—I have not seen many. I have spent most of my time on the Government estates, but such as I have seen, seem fairly good and some very satisfactory.
- 149. Q Do may of these require to be completed?—Yes, to a certain extent. The distribution channels or pains are not all out, and sometimes there is a little earthwork requiring to be done. The majority are completed, though the benefit to be derived from them has not yet been fully obtained. That is to say, the new rice lands have not yet been mado.
- 150. Q. In answer to question No. 1 you give the annual gross area oropped as 758,600 aores. On page 79 of the Bengal Report on Protective Irrigation the area given against your district is over 900,000 aores—the average of three years apparently. In a statement furnished by the Bengal Board of Rovenue, giving the averages of five years, the area is only 598,100 aores?—It is difficult to explain this. The figures in my statement are those accepted by the Director of Land Records.
- 161. Q. (Mr. Allen.)—There is some mistuke. The figure for 1901 was 577,400. There has been an increase probably?—It is extremely difficult to give you a correct figure for the district, because only one-tenth has been netually surveyed. The tenth near outlivated for that oue-tenth has been put down at about 60,000. About 600,000 or 700,000 is the probable figure for the district. There is a statement here showing what menay we were able to advance on the faming year. There is no mason why as much advance on the famine year. There is no reason why as much should not be advanced every year. I have figures from various other zamindars showing the enormous benefits that accrued to them from irrigation. The eventual return is seldom less than 20 per cent, and usually between 40 and 100 per cent, un capital expenditure.
- 152. Q. (Mr. Muir-Mackenzie.)-Wo are not to regard the instance you have given us an exceptional ease?—No. You have another ease in our settlement reat rell. There has

F. T. Lyall.

heon nn increase from about Rs. 35,000 to obout Rs. 74,000

T. Lyall. in, I think, 30 years, and it is elaimed there has heen no increose of rates at all. The Settlement Officer said in his report that this is entirely due to the introduction of irrigation. More than half the oxisting pains at the time of his settlement of 1896-97 were in disrepoir, and it has been owing chiefly to that we have had sach onormous difficulty in collecting our rental. I have had a year's root in arreors. Now I hope this year to be able to get sufficient collections to make ap for post had years. heon nn increase from about R. 35,000 to obout Rs. 74,000

153. Q. (Mr. Rajaratna Mudaliar.)—The gross areo of the district was over three million neres. I suppose the difference between the occupied area, 600,000 to 700,000 nod the gross areo, is ell hill and uncoultivated?—Yes, and there are large forests.

154. Q (Mr. Muir-Mackenzie.) - There is a considerable amount of colturable waste? - A tremendous amount.

(Mr. Allen.)-Ahoot 600,000 acres coltumble waste. A great deal more in reality.

155. Q. (Mr. Rajaratna Mudaliar)—I soppose want of population?—In this ectote I have spoken of they (the Court of Wards) tried to run a scheme of immigration of imported lahour, but I do not think it really requires that.

156. Q. (Mr. Allen.)—You were Sah-divisional Officer in the Sewan District of Saran. Did you see the work dona by Mr. Tytler in extending well cultivation by making advances !—I saw n greet deal of it.

157. Q. What opinion did you form of the honefit resulting from the extension of wells?—It was very great indeed.

158. Q. Do you think more might be done by extending well oultivation independs atly of the Opium Department by meens of takavi leans?—Yes, but it is difficult to do, because you never heve the personal relation with your tecants that the Opium Officer has. The population is too large for a man to get into personal touch with. But there is a great deal to be dono.

159. Q. Which may be done by n special officer?—Yes. Or if you let it be known through the police.

160. Q. (Mr. Muir-Mackenzie.)—Through the police?
—I do not mean to say that the police should give them
money; simply to tell them through the chaokidars that
money is available if they will some to head-quorters.

161. Q. (The President.)—Mr. Tytler's was a spesial work?—Ho must have spent three or four handred rupees ont of his own pooket to help the royate with medicines. He had most extraordinory relations with them and his was very exceptional work done for Government. He had 80,000 tenants and pereonel relations with all of them.

162. Q. (Mr. Allen.) -10 you recommend the granting of takavi to rajste?—They won't take it in Polomeu. They are tenants-at-will and have no security of tenuro. They may make the improvement and be onsted from their lands. In Government estates some will take it, but even there they ore liable to have enhancement of rent.

163. Q. Do you think rayats ought to have enhancement of rent for improvements used by them or to have an immunity similar to that given under the Boagal Teaenoy Art?—It would he n good thing, but it would mean the taking away from the zamindars many of the rights that they have now in having these meu as tonootsat-will. They have not appreciably nbused them eo far.

164. Q But would it not be a good thing to prevent the zamindar subonoing the reat owing to increased profits of the rayats by improvements effected by themselves?—Tho position now is that the rayate are not making improve-

165. Q. If the rayots took takavi from Government now, would the first thing that the zamindare would do he to jump up their lands ?—I think so.

166. Q. (The President.) -At once?-If they were bad

167. Q. There is nothing to prevent them hy law?-Absolutely nothing. The only man who makes an improve-ment is the mon who gote the lense of a villoge; and the custom of the country is that if he chooses to make an improvement in the matter of alars or reservoirs, he is given half the cost by his landlord and is entitled during the onremoy of his lease to take all the profite he can get, and at the end of the lease the rillogs gees bock to the feudlord and he resettles it ogain, neually nt on enhancement of 25 or 50 per cent. Rentols nro increasing very very largely in the district.

168. Q. (Mr. Allen.)—You told Sir Thomas Higham that this 8,000 acree irrigated from Government works is

probably a mistake. Is it not the case that Government spends a considerable sum in constructing and maintaining ahars in the Government estate?—No. I do not think it has regalarly in the past. I enhmitted a long report to Gaverament on the subject.

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169. Q. Bot money has been given this year?—Yes; I got Rs. 25,000 from Government.

170. Q. Was that for construction or meintenance?—
Chiefly for repairs. There was a limit of about its. 4,000 for construction. A certain percentage of the rent roll is set aside for improvements. It is not nearly sufficient in a district like this. If Government wishes to make an estate like the Khes Mahala a paying concern, they must make a great doal more improvements.

171. Q. (Mr. Muir-Mackenzie.) - Was it ust the business of Government to moke these repairs without enhancement !-- Yes.

172. Q. (Mr. Allen.)—Your proposed to enhance lond during the currenny of the setiloment referred to large now echemes?—Original schemes; they need not be large.

173. Q. In a case like the Nadoora scheme, in addition to the actual increose of rent which the Government might obtain, would it not also gain something in the increased security of its collection?—Very mach.

174. Q. Whot is the porcentage of your collection now? -Mr. Escheroft has submitted roturns for three years, of which two wore very good years and one a bad year, and he showed that our collections were only 83 per cent. of the total demand. That is a very heavy arreor, and just now about a year's rent is in arrears.

175. Q. To what extent can that porcentage of collection be improved if Government spend more monoy?—In ordinery years, we ought, on a estilement like this only ordinery years, we ought, ou a estitement like this only lately finished—supposing our classifications be correct—to get a cent. per cent. collection. The Settlsment Officer recorded in 1897 in his roport that noless these repairs, for which I obtained a spesiol grant this year, are ondertaken, Government must look for arrears of reut.

176. Q. What is the conditions of the rayats in the Government estate, presperous or the reverse?—Very much the reverse. They have been impoverished to the lost

177. Q. Heve they been abandoo lng the estats ?—In considerable numbers. There is one outpost area which is reduced by very nearly 25 per cent.

178. Q (The President.)—Where do the people go to ?—Anywhere; into Ranchi or elsewhere. The competition for rayats is very great in the district.

179. Q. What is the abandoument of their holdings due to?—Many causes; to a great extent to this motter of irrigation; also to a very large extent to police oppression, the formation of forests and restriction of their rights of burning end grazing; and also to oppression on the part of the Government Tahsildars.

180. Q. (Mr. Allen.)—Is it partly due to the failere to maintain the abare?—Yes; we have hed most hitter comploints about it.

181. Q. (The President.)—How loog hes that gone on?
I think five yeors.

182. Q. Years of high prices and hord times ?—Yes. Previous officers have given returns of good crops, choriog that reats wers low and that the tenantry are well off. I count find it so. It is my personal opinion, and I heve toored a great deal and goue into it very oarfully.

183. Q. (Mr. Allen.)—You have Mr. Horn's note on the projects in Palsmao in which he soys "Mr. Maconchy states that the area commanded is 5,375 eeres, of which holf might require woter if made available." Is that a correct estimate?—No; that is very excessive.

184. Q. What do you has your opinion on ?—I andorstand that he means that the area within which water can be introduced is 5,875 acres. I do not think that half that area is under rico.

185. Q. It ought to read " the area commanded is 5,375 cres, of which a quarter might require water "?—Yes.

186. Q. Thet affects the etetistics right through as to the emonot of wotor required. There are no details given in these estimates os to the cost of eorthwork. Whet would you cousider the proper rate to pey for earthwork on these schomes?—In the Khas Mahals 650 onlie feet to the rupee. It works out at Rs. 1-9 the thoosand enbio feat.

187. Q. In Mr. Macouchy's note on the Peerce scheme he stetes that as Mr. Carter (?) makes no mention of alure

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as in the previous scheme, there are prabably none. Is that carrect P--Na.

- 188. Q. Are there as many alters there as in the previous solution ?—In that matter it is one of the best aff parts of the district . the district.
- 169. Q. You gave us same statistics as to the increase of 189. Q. You gave us same statistics as to the increase of rents in the Nawa estate due to irrigation. Have you any more figures P—Yes. Thakarai Gubind Porshad Ningh, Zsmindar of Rauki, wrate to mand the Tasra echeme, an which he spent Ra. 7,000. Ha shows that before the construction of this work he had only 200 bighas of rice land. Naw he has gat 300 and he axpects in addition 250 bighas. The antiurn has been raised fram 10 maunds that higher to 25 manuals (kacheha maunds). -the bigha to 25 maunds (kachcha maunds).
- 190. Q. What is a kachcha mannd P—Elaven-tweetietb of the standard maund.
- 191. Q. Of rice, not paddy?—Of paddy. Kuar Leljivan Sinha was another saminder to wham we advanced money. He says "my paddy fields of village Tenrai yielded about 2,000 maunds of paddy, but I used to get no paddy in a failure of rainfall, so that the everage yearly produce did not amount to more than 600 or 700 maunds; but since I have constructed a bund at a cost of its. 3,000, I get 2,000 manuals avery year." It is important in this mattar to quate from Mr. Maconchy on rainfall. He says that one year out of every faur is a dry year. There must be irrigation to get anything above an 8-anna arop. The zamindar farther says "similarly in the case of Kudaga village I get 1,500 maunde of arops every year since I have constructed a bund at a cost of Rs. 6,000, though the average yearly praduce was not more than 600 to 700 maunds before." my lands of Nawadah village have been converted into paddy fields by the construction of a similar bund at a cost of Re. 2,500, and the average jearly produce has been increased from 200 to 600 maunds."
- 192. Q. In these estimates a provision is made for the acquisition of land. Would it be necessary to pay for land you might require for weirs or channels?—Nu.
- 193. Q. (Mr. Rajaraina Muduliar.) Nat necessary to pay campensation ?- Nu; they are all tenants-at-will.
- 194. Q. In Gavernment estates is there ant a sort of qualified occupancy right?—There we simply take the lend and give them mare valuable lend alsowhere. We do not have to pay in maney.
- 195. Q. (Mr. Allen.) In the softlement tables it says that third class rice land is equally rented with first class rabi. But it is twice as a rule; third class rice is double first class rabi! - In one or two perguanabs it is ea.
- 196. Q. That shaws the enormans value of rice as compared with rati in the dietrict. First alass land scens to be irrigated; second class nat always irrigated; and the third class depends on rainfall. I should like to meka it quito clear. The increase that Government might abtain wanld

be, firstly, from the rising of land from one class into a higher one; secondly, by the imposition of ront on newly F. T. Lyall. caltivated lands; and, thirdly, by the security of collection P-Yes.

197. Q. And, as regards onhancoment of rent, cen you give usany idea what that would averega over an area?— I could give figures for every village which was affected; that is, we have a list of all tha fields alassified at such and

198. Q. On what basis would you work out such an estimate? Would you assume that the laud at all the lawer alsesses was raised a alses?—No. We cauld not go quite an far as that. We should have to go on to the lands and see how much we thought would be affected.

- 199. Q. Hes any estimate like that been warked aut f-Yes, far the imperfact figures for the Nudnura scheme.
- 200. Q. What was the result !- The result of an increase in this Nadeum scheme of Rs. 1,000. It was estimated the scheme would only east Rs. 10,000.
- 201 Q. (Mr. Rajaraina Mudaliar.) Yau just said that 201 Q. (Mr. Rajaraina Mudaliar.)—Yau just said that the tenants in Govaroment estates were in an imporarished condition. Would not that be due in some measure to the rents having been raised from Re. 11,500 to 26,000 mr 27,000?—Tha figures you quate refor to the Nawa estato. The authencement of tents in the Cavernment estates affected their condition, but only in a measure. The rants were in many cases fair if the irrigation works were kept in repair. But in some pergunuals they have a system under which a village is divided into chares. A man was given a lump, and ha was tald "yaur tent is so much and yau can autivated. and ha was tald " your rent is so much and you can autive to as much as you like." But now we have introduced rent as much as you like." But now we have introduced rent far every acre of land braught under cultivotian. They object to that very strongly.
- 202 Q. The correct fallows are about 600,000 acres, with a comp area of 190,000; that is a large proportion. I suppose the tenents have to pay for such fallows? They used not to have to, but now they have to. Up to now they have avoided that by bringing new lands under cultivation. Now we have a system of keeping near records up to date, and we impose revenue on every piece of land under aultivation. I do not think we ought to. It only comes to 2 or 4 annas a for these bigha uplands. They are not supposed to relinquish a port of their holding. That also presses hard on them at times. The Deputy Collector has perfect direction in the matter, the content of the property collector has perfect direction in the matter, the content of the property collector has perfect discretion in the metter; be can recammend rebatement ta the Board.
- 203. Q. I find fram the Bengal Government memarandum that in this distrat provision is made for famina railef for 1.9 per cent. of the population of the area liable to be affected. Could you not find works for making a larger pravision?—These schemes that have been taken up by the Public Works Department are the auly large ones we have. We have a certain amount of large road warks un which we could also counter them. which we cauld also employ them.

# WITNESS No. 53 .- Mr. S. C. Sen, Vakil of Manbham.

- 1. Q. (The President.)—Do you passess property in Manbhum?—Yes.
- . 2. Q. Do you consider the whole of your district subject to occasional drought and famina?-Yes.
- 3. Q. Answering question 8 ynu divide ynur district into two parts, north and scuth of the Damada. Is that on account af the nature of the soils?—And also uf the presence of the collieries.
- 4. Q. So that, whon the scaroity was bad there, the people had amorthing clee to turn to P.—Na, in the matter of water-supply. The colliery waters should be stored in big reserrairs; at present the water goes off into the Damada a very large quantity.
- 5. Q. Would it fill a big canal?—I chould think so. Yuu will find a very large number of collieries in each villaga, eight ar tou, each pumping a large quantity of water, and for fifty villages the quantity of water wauld ha
- 6. Q. Wauld not the best plan be to utilise it after it had got into the Dumuda?—My suggestion was to utilise the water by sturing it up in big reservaire.
- 7. Q. If the Government made reservoirs or gave coma means of sopplying water, would the people take it every year? - Whonover necessary.
- 8. Q. But how uften would it he necessary? Once in three ar faar years?—For the last nine years it has been necessary avery year.

- 9. Q. And they would be willing to pay for it P-I do Mr. S. C. not know if Government would be outitled to get any cess. Sen. If Government undortakes to da work, it ought to pay for
- 10. Q. Nut charge for water ?-Nu. The Public Works cess was introduced to prevent famine.
- 11. Q. Are the people, with wham you are familiar, willing to take leans to carry out warks?—Yes; but the leans are not used far the proper purpases in most cases.
- 12. Q. In other parts of Indie we have found great advantage taken of the system of lanes for irrigation works?—The people in this part of the accentry are not so well educated and they are very needy.
- 18. Q. Are the bunds in villages generally kept in gaod repair ?-Na.
- 14. Q. Should any pressure be put un the zamindars or on the raunts to keep them in repair?—Yes, on the zomindar for these which are his praperty, and un the rayets for those excavated by them.
- 15. Q. You say that existing bunds could not be extend-oil without destroying the paddy lands adjoining them. But ahars could be despended f—Yes.
- 16. Q. And the bunds built up with the earth taken ut?—Yes. The reason is this—the ahar in this acuntry is out ?-Yes. made by patting in one or two bunds in which there are three ar two natural bunds, and immediately below tha new works the paddy lands grow up. These are irrigated by

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Mr S. C. the re-colation of the water. But if you want to extend this band, you must naturally remove the embankments and destroy the land.

17. Q. Yau thiak bunds are preferable to wells ?-Yes.

- 18. Q. What is the objection to wells !- A well can irrigats a very small area, and a bund mada with the same amount of money would irrigate a larger area.
- Rajaratna · Mudaliar.) Bat build you would get un water if there is a failure of raio and a well has springs?—I have not seen a build running dry through a failure of rain. They are dry if the ahare are broken. Generally there is a large accumulation of water in a bund that is properly made.
- 20. Q. What area would be irrigated by a well?-About 10 bighas, 3 acres.
  - 21. Q. What would it cost?-At least Rs. 500.
- 22. Q. Regarding the misappropriation of loans; ampreso they are given in instalments after a portion of the work has been actually done !- it would be minimised.
- 23. Q. As regords the reduction in the reot recoverable from men who have constructed works, do you cancel it if the work is not kept in order?—No. The settlement is permanent after the band is made.
- 24. Q. Wauld it he a good plan to do so?—No, because he suffers equally if his land is not irrigated.
- 25. Q. You might enfaros this?—When such arrange-meat is made at the time, jalsassan settlemeat is made, yes.

WITNESS No. 54.—RAJA BHAGWAT DAYAL SINGH, Chainpar, Palamau.

Raja Bhaqwal Payal Singh. 3 Nov. 02. 1. Q. (The President.)—In which district are your lands situated?—In Palamau District in the Chota Nagpur Division.

2. Q. I suppose you have been long n resident in this district?—Yes, from several generations. This is the 18th generation that I have been in this district.

- 3. Q. And da you consider that irrigation is a very valuable thing in the district?—Certainly, irrigation is a very valuable thing. Our district is very hilly and rocky, ond without irrigation it cannot yield anything it all.
- 4. Q. You have a good deal of rainfall there?—For the last six or seven years we have had very bud rainfall. Since 1896 at 1897 our crop is always failing.
- 5. Q. Do yau think that if yau had good irrigation works in your district, that the people would take irrigation every year?—Yes, every year without fail. Our country is very dry, drier than Purulia, I think, and all the people are vary much in need of irrigation
- 6. Q Wauld they be willing to pay a water-rate?—Yes, quite willing.
- 7. Q. How much could they pay?—They can pay anything. Up to this time we have only erected bunds for irrigation purposes.
- 8. Q Do you know the Shahabad District where the Saae canals are?—I knaw it very well.
- 9. Q. Would they pay as much as the people pay there?—Yas, I think so; they would pay even mare than Shahabad, I think. They see that the Shahabad peaple are daing very well, and peaple thate, whose lands did not yield befare, have, since they have got the canal and irrigation, became very well-to-do.
- 10. Q I suppase that the kind of irrigation you have in your lands is all by pains and abars?—Oaly pains, and we use same small rivers far irrigation. We make bunds and get first af all a reservoir and from that we irrigoto our lands.
- 11. Q Do yau think anything mare than that is necessary? Do you think any larga works would be suitable in your district?—There are many big rivers like the Koel, Amurnath, Knadbar, Myla, Tulhir, which might be utilised, but they always get dry in the hot weather.
- 12. Q. Have you looked into the figures of this scheme nt all? Do you happen to know what the cost will be?—I have the experience of my own estate where I have been warking for the last 25 years, and I have got some experience with other big warks, just ns I have with small works.
- Just as I have with small works.

  13. Q. Are the peaple in your lands willing to take loss from the Gavernment to help them in irrigation?—All the ramindars of Palamau have taken loss from Gavernment and we have done lots of good wark. Of caurse there may have been same people who misappropriated the money, but lots of them have done very good work.
- 14. Q. Can they get loans quite easily?—Yes. Thay all get laass and all of the loans have been refunded to the Gavernment with interest.
- 15. Q. We don't often hear of big sums being given but by the Deputy Commissioner?—In the famino year lats af maney was given to the zamindars, and they all worked very well. Not a single pice was misappropriated by the zamindars.
- 16. Q. Do the people complain at all af the terms or of the interest they have to pay?—Thay feel this difficulty that if they fail to pay once, there are some rules that the whole thing will be taken at cace. Of this they are very much afraid.

- 17. Q. (Sir Thamas Highom.)—What rata of terest da they pay?—They are paying 6 per cent.
- 18. O. (The President.)—When do they repay it; after how loag?—They pay it back in five years; two or three instalments a year.
- 19. Q. Da you think that if, instead of five years, they were given 10 et 20 years, it would be better?—
  It would be very henchical to the zamindars and to the whale district, and also for the Government.
- what district, and also for the covorament.

  20. Q. They never give it for more than five years now?—No. All the zamindars and even the rayate wanld take leans very gladly; anly they are afraid that if they fail to pay on a fixed day, all the conditions will be impased and all the remaining maney will have to be paid back at once.
- 21. Q. Are there many wells in your district?—Yes. Our district is vary rocky, so we cannot irrigate properly. There are lats of wells.
- Our district is vary rocky, so we cannot irrigate properly. There are lats of wells.

  22. Q. Are the wells very expensive?—Natvery expensive, but still the people have not any money to spend on well irrigation. Sugoreane we always irrigate from wells. If we can get irrigation from reservoirs (bunds) and we have any good ones, we must irrigate from them.
- 23. Q. In these had years yan have told us of wore the wells dry, or did they hold water?—The wells were not dry; only the small reservoirs wera dry.
- 24. Q. Haw deap have you to dig before you get down to water in the wells?—In lots af places after eight at ten fect you find water.
- 25. Q. Would they last right through a time of drought?—Yes, but they can only irrighte a small quantity of laud.
- 26. Q. How much 10 bighas?—Not so much. By poins we can irrigate 200 or 500 bighas us the case may he. If we get a good hig reservoir, we can irrigate 500 bighas or even more from it.
- 27. Q. (Mr. Muir-Mackenzic.)—Have you yaurself taken money from Government?—Only Rs. 2 000. The other people were afraid to take lasas from Government, so I came forward and took Rs. 2,000.
- 28. Q. And you have spont this Rs. 2,000 in making improvements?—Yes.
- 29. Q. Haw much did yan spend in making acw pains altogether?—In six years I have spent more than Rs. 36,000.
- 30. Q. Has the result of that been to bring much more land under irrigation?—Yes.
- 31. Q. Can you say at all how many bighas you have brought under irrigation?—I think, sa far as I can remember, I am new aarning nearly Rs. 7,000, and hope to earn more whan I can turn the land inta paddy fields. I think, after spending Rs. 10,000 ar Rs. 15,000, I ahall make an income of nat less than Rs. 10,000 ar Rs. 20,000.
- 32. Q. You have already got an increase of Rs. 7,000 after spending about Rs. 36,000?—Yes. I shall oarn mare when I can turn the land into paddy fields. That takes a lot of time and expense.
- 33. Q. Haw long daes it take to turn the land into a puddy field?—You can turn it into a paddy field in one year, or if the land is high, it takes two or three ar five yaars.
- 31. Q. Has tha Rs. 36,000 you say yan hava expended include what yau spent an turning the land into paddy fields?—So far as I remember I only speat nearly Rs. 36,000 in six years.
- 35. Q. Haw much of that did you spend for ritins and how much for converting the land into fully fields?—I have spent nearly Rs. 4,000 or Rs. 5,000 in

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turning the land into paddy fields, and the remainder on the bunds and channels. It have not prepared all my paddy fields as yet. The work is still going

36. Q. Wore these channels you speak of for taking the water from the pains into the fields?—From the pains and from the rivers both.

27. Q. What sort of outlet do you have from your bunds.—I make some pakka bunds and also some kachcha bunds.

38. Q. For that you put in what sort of outlet?—
I had to expend its. 10,000 in two years in making channels and making some palka bunds.

39. Q. How do you let the water out of your pakka bunds?—By cutting a channel undermeath it.

40. Q. You don't put a pipe under the bund?-No. requires a little experience to see whether the water will come to a place or not.

41. Q. If you could get an overseer's or engineer's help, would it be an advantage?—Yos. I have made a pulla bund and cut a channel. I expended Rs. 12,000 on the work. I again undertook the work last year. Of course I took the level of the river in my land and then I cut a channel and took the water out very easily and have irrigated the whole of my paddy land, and it is now in very good condition. Palaman is a very backward district and very hilly, and unless we irrigate it can yield nothing.

42 G. (Mr. Rejaratna Mudaliar.)—If you construct

42. Q. (Air. Rajaratna Mudaliar.)—If you construct bunds, do you enhance the rents.—Up to this time I have not enhanced the rents, but when the rayats get some benefit I may enhance them.

. 43. Q. So you have power to enhance. You find no difficulty!—They are quito willing to do this. My rayata especially are quite willing and ready to enhance their rents if I can improve their lands. There will be no hitch so far as I know. The rayats are very much in need of irrigation, because, if you get good irrigation, your crops will not fail, and for the last six or seven years there have been always failures and they have been getting nothing.

44, Q. Havo your rayats occupancy right?—In my zamindari there are no occupancy rights.

45. Q. Is there scope for constructing wells?—Yes. The poor rayats cannot construct wells at their own expense, but they used to excavate wells, especially the conhars.

46. Q. In such cases you don't enhance rents?—No. 47. Q. (Mr. Allen.)—You said you had got Rs. 7,000 profit. How did you got it?—By irrigation.

48. Q. How did you get it?—In my own cultivation. There are a few rayats there also. I think more than half is under my own entiration and about half

49. Q. What improvements in the yield of a bigha of ground do you think you can get from irrigation?—In good places, if the fields be manured properly, they would yield about 40 maunds kachcha per bigha.

50. Q. What is the yield from unirrigated land?—That is very uncertain. If the lands yield something, we get rent, and if they do not yield, then what can we get?—and if we do anything harshly, then the rayats wil go away. In our district for the last six or seven years we are all suffering from want of rain.

51. Q. (Sir Thomas Higham.)—When you have made an ahar it silts up after a time?—Yes, after a long time, probably after 10 or 12 years as the case may he. There are many kinds of ahars—big ahars and small ahars; the condition of all ahars cannot be the same? That is why I say 'as the case may be.'

62. Q. What do you do when they silt up?—Do you clear them out again?—Yes. It will be very beneficial and you can get more water into them than before.

53. Q. After how many years?-10 or 20 years as the case may ho.

61. Q. Do you clear out two or three feet of ealt?-

55. Q. Do the people clear the ahars themselves, or do you have to pay for it?—The rayats cannot pay; we do it ourselves. They are poor people and where can they get so much money?—They have always found difficulty in paying the rents during the last six or seven years of famine.

WITNESS No. 55 .- Mr. A. Cooke, Ten Planter, Ranchi.

1. Q (The President.)—I understand that you are a ten planter?—Yes.

2. Q. In Ranchi?-Yes.

3. Q. Have you been long in that country?-Nearly 19 years.

4. Q. Wore you here during the times of famino?—Yes, I was there in 1896 and 1899. There were two famines.

5. Q. Do the natives complain of the high prices there? The Deputy Commissioner told us the prices of food stuffs were very high?—They are gotting that

6. Q. You say no land is irrigated after the rains cease?—Yes.

7 Q. And you say "all the present cultivation depends on the rainfall, and the rayats seem to think that it is useless to raise water and that actual water from the clouds is required." Do not the pains irrigate long after the rainy season?—Very little after the rainy season; practically nothing. The whole district has lad no rain this last hathia.

8. C. It is an odd thing, is not it, that it is that water which is stored up that pulls them through?—No. It is owing to the failure of the rain that the water does not overflow and they never raise it.

9. Q. You say that irrigation is not wanted at all?— It is wanted to increase the area of the cultivated lande, but it does not protect against want of rain.

10. Q. You say "the whole country is undulating on the plateaus and thus offers an immense area to be improved by bunds, and I think that entire tracts of high and useless land might be watered from reservoirs on a higher level by means of pipes or aqueducts of any description which might be studied from Australian example." Do you know Australia?—No, but I have heard peeple who have come from Australia talking about it. I have had a man recently with me who has come from Australia and he is very strong on this point. The fields use about 10th of the rainfall; 13th flow away. If you make a channel and get it round one hill to another, the water could be led to places where it was not accessible before.

11. Q. You don't mean that water should be pumped 10. Q. You say "the whole country is undulating

11. Q. You don't mean that water should be pumped up into a resorvoir?—No, only the unrequired overflow.

Cooke, Tea Planter, Ranch.

12. Q. In reply to the question "Name the years in which reliable records show that there has been (1) famine and (2) severe scarcity not amounting to famine." You say "1896 and 1899," and you go on to say—"but I think that a large proportion of the crops could have been saved by raising water above the normal lovel of the outlots or by deepening the outlets, and thus irrigating some of the fields with the water stored in the reservoir." Was there not water in the reservoirs at the end of the rains that was not used?—Yes, the whole reservoir was full of water. There is a considerable lot of water which could be used if you could get it out by sluice gates, or pumping machinery of some sort.

13. Q. You mean it is below the level of the soil?—

13. Q. You mean it is bolow the levol of the soil?-Yes, far and away below.

14. Q. You say in reply to question No. 9—"What general measures should be adopted for extending irrigation in the district by Government or private works?"
"Ascertain the cost of bunds already established and the profits from them; this alone would attract capital into the district." You mean, I suppose, to publish them?—"Ves lish them?-Yes.

15. Q. You go on to say, "I know of one spot where a valley sends its water through a narrow gorge, and could thus be made to irrigate a large tract in the lower valley at little cost, and there are thousands of such places in the district." I would rather not have Sonapet mentioned.\*

16 Q. Has it over been examined by Engineers?—No, never. In all these gorges there are hundreds of places like that where you get valleys opening into

17. Q. Yon think, if you publish the results of works already established, you will attract capital into the country?—Yes. I believe in the country thoroughly myself.

18. Q. What is the Barkagarh estate you speak of in your memorandum. Is that a model farm?—No; I think it was taken over in the Mutiny. It is now a Government estate, worked by Government. It is about soven miles from Ranchi in a semi-circle.

19. Q. Then you say: "I recommend that trials should be made to put ammonia into water raised from reservoirs. This may be the reason why rain is necessary. Rain contains about one grain of ammonia to

Raia Bhaquat Dayal Singh,

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Mr. A. Cooke.

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Mr. A. Cooke. 3 Nov. 02. 144 cubic inches of woter; this would be supplied by a very small amount of artificial manure." Does the water that fulls into these reservoirs drop all its ammonio?—After rain stops the woter that continues to flow is droinage water and therefore partly filtered. The rayots tell me there is no use raising water. They saywater must come upar se. That is a more suggestion of mino.

- 20. Q. Then you go on to say: "the most valuable concession would be to advance money on easy terms." Has the rayat get ony difficulty in getting money in that way?—He cannot get money at all except through the mahajaa at big interest.
- 21 Q. The Deputy Commissioner advances money to the raynts; does he not?—We have started now. Ho has given me the cherge of a village bank with Rs. 300 to start with.
- 18. 300 to start with.

  20. Q. Besides that, the Deputy Commissioner has in his lands a certain amount of Government money to moke odvences to the district in general?—If you advance to one man, then there is always the difficulty to get it back on his own individual scenity. The new principle is to advance to the village as a whole. They advanced a lot of money to the rayats in 1897, and they are still trying to recover that money now.
- and they are still trying to recover that money how.

  23. Q. (Mr. Maur-Mockensie.)—About this statement that there is no land irrigated after the rain ceases, do you mean that if there is no uhor which is thied during the mousoon, and there is to break for some time, that no water can be got from the abor to irrigate the rice fields during the breakf—No. As soon as it is filled it overflows, and it stops overflowing as soon as the rain ceases.
- 24. Q. So that the only benefit of the rain is that rather more water is got than the rain gives which falls on the lands?—The benefit derived is that it extends the area of cultivation; you get in mare fiehls.
- 25. Q. I don't quite understand that?—For instance, if there is o small valley and n little embankacent across the hottom of it oud from that the water comes down both edges, then you get in nil the other sules of the slope. This one bund I am speaking of in Rampur will irrigate about 200 ocres of land eventually when the fields are level.
- 27. Q. Have you ever heard of any zamindars wha have received advances to make bunds having made considerable profits by itf-No.

In my evidence on 3rd November at Purulia I riated that the stored water, in the reservoirs formed by embankments, is not used by the rayats after the rains cease. On the next day I saw the Hazarinegh Local Board District Engineer. He told me that after the rains cease, the rayats raise the stored water and thus continue to irrigate their crops.

It is possible that there is more need for irrigation in Hararibugh than in Ranchi, but from observation in my neighbourhood and enquiries from the natives I am sure that the practice of throwing up water has not yet been adopted in the Ranchi District.

I wish to point out that, although my evidence in this matter may be doubted, as being controverted by the evidence of the Hararibach District Lingineer, it will prove on further enquiry to be true.

In Hazaribagh the rayats do raise the water. In Rouchi the rayats do not raise the water. I will suggest to the Deputy Commissioner of Hanchi that a few Hazaribagh rayats whall be engaged in the Harkagarh estate to show our people how it is denogand to prore to them the possibility of saving a part of the crop in bad syatoms.

Theirsteen of the property of cubicating and the

The increase of the most of cultivation and the eaving of a part of the crops when rain fells has very little bearing in the natter of preventing famine compared with the possibilities of enabling the rayats to heep that they get in years of plenty.

To put only one instance before you.

Rents ore due in October and January.

Rayats sell their rice to pay their rents.

In October 1902 in Ranchi the price of rice was 13 seers per rupce.

In December rice will sell for 16 seers per rupre. The rayate will pay their October kiets at the ratio of 13 seers and their Joonory kists at the ratio of 16

In the following August (1903) the price of rice will be 8 seers per rupes, but the mysts will have none left to sell, and in many cases will have sold their seed rice to pay their rents.

The rayots has sacrificed 18 seers of rice in October deposit is and 16 seers in January for every rupes of his rent. interest?

- 28. Q. We bad considerable evidence on the subject this morning from the Deputy Commissioner of Palamau. You were not here then?—No.
- 29. Q. The Raja of Chainpur also spoke of it. And Mr. Lyall told us of one estate in which they had advonced Rs. 11,000 for improvements and were enabled to double their rents. You have never heard of any instances of that kind?—No particular instances.
- 30. Q. You think if the zamindars will moke bunds they will get considerable profits?—Yes.

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- 31. Q. You don't think there is anything unjust in their raising their rents?—No. They make woste lands into valuable lands. I have nover made bunds navelf.
- 32. Q. The village bank is an agency by which you advance money to the rayat end not to the zamindars?

  —Yes, to the rayet direct.
- 33. Q. Are not the royats of the district tenents-atwill?—I know nothing about their tenency.
- 31. Q. Is there not the danger of a rayot being ousted at the will of the zamındar?—I don't know that; still that does not affect the security of the bank.
- 35. Q. Has your bonk advanced any mosey for ogricultural improvements?—Rs. 300 once and Rs. 200.
- 36. Q. What sort of improvements?—The Rs. 300 was given without my conditions; that increly told us it was for cattle, but the other was advanced only for making fields and I saw they did so.
- 37. Q. You don't think the rate of interest at which money is given at present—one mans on the rupee—too heavy, do you?—No, I think it is right. But it is two annas on the rupee is it not?—The Government advance to us at one onna on the rupee, and we take two annas on the rupee. The surplus will repay the fund eventually.
- 39. Q. What does the mahajan charge?-That I don't knew. I really could not say anything about that
- 39. Q. Does the country about Ranchi differ very much in configuration from the country in Palanau?

   I have not seen Palanau. The whole of Ranchi is a plateau. It is all undulating ground.
- 40. Q. Are there a good number of streams?—Very few streams. There are only two rivers and some nullahs, which are only channels for the flood water.

If he could have borrowed the amount of his rent in each and put away his rice, he would be able in August to sell his rice at 8 seers per rupee, repay the loan and interior, and would have a balance of rice for his own use.

Ifo would have saved 5 seers per rupee in October and 6 seers per rupee in January.

This would surely have a better effect than any amount of irrigation.

The saving of money would imply more perfect irrigation.

It is money at low interest that is wanted and not more nater.

Below I give an instance which may illustrate the effect of advancing cash to the rayats and taking over their grain in trust.

Instance of a man who pays Rs. 54 renf.

Due in October		:_	:	:	:	:	•	21.	000	P
Advanced Interest of Required	D Ra.	54 @	G) pe	r ecn	ı	;·	:	34 3 37	088	
Without a loan be In October of In January (	13 g	CIS I			•	:	<i>;</i>	814 402	10E	10,
To keep this till !	lugu:	i mre	Då R	lous c	'To of 20 1	tal er co	ní.	763 :156		'. ;
To pay Rs. 37-6-1	@8:	icera	of ric		rape :			627 460	,	

This would either be kept for food and aswing or sold at 3 seers, and thus secure another its, 20-14-9 which is nearly enough to pay the following theober. List without borrowing.

Is it feasible to form grain banks, taking grain, as deposit in trust, and suivancing cash at moderate interest?

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3 Nov. 02.

# WITNESS No. 56 .- MR. WOODHAB CHANDRA ROY, Ronchi

# Replies to printed questions.

1. Q. (The President.)-You are from Ronchi?-

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2. Q. Are you a zominder there?—Yes, I have some petty zaminderis there—e few villeges.

- petty zamindoris there—o few villoges.

  3. Q. Are you in Government employ too?—No. I am an Honorary Magistrate.

  4. Q. You soy here in reply to question No. 10—in Bunds are gonerally constructed by throwing ombankments aeross hill streems or lorgo drainage areas. The existiog bunds have been mostly constructed by zamindars and they how the entire control over in The state of repair is very miserable, because most of the zamindars are not well off and cannot offord to keep the bunds in proper repoir; and for this account they fail to supply needful quantity of water in the years of drought. The chief obstacle in the way of extension of bunds is the poverty of the zamindars, and so long as the existing law continues, the rayots have very little inducement to invest any money in embonkments even if they hove money and inclination to do it, as under the Chote Nagpur Load Law the rayats never acquire saleable or transferable rights to the land. I may add that, if this obstacle is removed, the rayats of themselves will take to constructing bunds and provide other means of irrigation in years of drought at their own cost. They will in that cose olways try to effect moterial improvements in whot may then be properly called their own lands. You say the zamindars are too poor to keen the bunds in order?—Yes.

  5. Q. Why don't they borrow money from the Gov-
  - 5. Q. Why don't they berrow measy from the Government?—Well, if a zamindor dies heirless, his estote goes free of encumbrance to the Chota Nagpur Mallornia, so that these zamindars, who see that they hove no successors, do not take any interest in their estates. It is a strong sort of law here.
  - 6. Q. But it would be profitable for the zamindar to hove his bund in good order, would it not? He would get more revenue out of it?—Yes, for the time being it would be profitable; but unless his estate is saleable or transferable, I think there is no inducement for him to do this kind of work.
  - 7. Q. Then the zamindar's property is not transferable here?—Not transferable, nor saleable, without the liability of resumption by the Maharaja on failure of male heirs.
  - 8. Q. Have you got any wells in Ranchi?-Yes, wo
  - 9. Q. Are they used for irrigotion?—In vegetable gardens. They also irrigate sugareone.
  - 10. Q. There is no cultivation of sugarcane in Ranchi?—In Bondoo there is sugorcane cultivation. There is a lorge embankment there called the Bondco bund. The bund belongs to me. I have stored a large quantity of water there, and more than four miles in length is sometimes irrigated in a year of drought. It is the very biggest bund in Chota Nngpur, I think Mr. B. C. Bose has dealt with it very largely.
  - 11. Q. How high is the bund?—It is not very high, about 10 or 12 feet high, but it is very long end wide.
  - 12. Q. Do the people wish for irrigation in Ranchi? Do they wish to have things better than they ere there?—To make irrigation work of Ronchi is very feasible and less costly.
  - 131 Q. You mean by making ahars? Ithink by dividing the spring of the hill streams you een make more cultivated lands and can cosily irrigate. I have got o rough sketch here (explains what should be done on mop). This is the hill and these ore all streams. The water fells in this way, but this pertion of the land has an indinction to fall this way.
  - 14. Q. When does that stream (indicates it) get dry?
    About the lat of November?—Sometimes before that.
    If we can raise bunds here (indicates it), we can get the water there all the year round.
  - 15. Q. Do you think the people would use water every year for irrigotion?—Yes, sometimes in years of drought.
    - 16. Q. Not every year? Every year it is not neces-
    - sary.

      17. Q. Would they pay fer the water?—Yes, for the Bundoe bund they do poy.

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- 18. Q. Supposing we make new irrigation works, would the people be willing to poy for them?—Yes. W. C. Roy.
- 19. Q. Would they pay as much as they do on the Seno canols?—I don't know the rate there.
- 20. Q. Rs. 24 or Rs. 2-8 an acre?—No; I think they will be willing to pay Rs. 1-8 percacro
- 21. Q. But they wish to have irrigation?—Yes. Large irrigation works are impracticable in Chota Nagpur, because of the country being unduloting and of the louds being scattored here and there; they are not in one place.
- 22. Q. (Sir Thomas Higham.)—You told us nothing about the way in which these ahars silt up. You say that most of them are in miserable repoir. What is the matter with them?—The silt is not elected.
- 23. Q. The silt has accumulated in thom so that they won't hold water?—Yes.
- 21. Q. What do you do for that?—The silt has to be removed.
- 25. Q. Is it worth while removing the silt?—Yes. The silt con be used as manure.
- 26. Q. How far do they carry it to use it as monure?

  These people only use o country cort and carry it a mile off.
- 27. Q. They have to pay men to take it oway?— Certninly not. I don't charge them anything for it.
- 28. Q. You let the men come and take it away?-
- 20. Q. You don't pay them anything for taking it away?—No.
- 30. Q. Why don't the rayats do that?-I have already said that the rayots have very little ottoch-ment to the land. They know that, by making im-provements they will not benefit at all.
- 31. Q. How long does an altor go before it wants cleaning out?—It should be cleaned every fifth year.
- 32. Q. Is there much stuff in it then?—Every year more than a foot of silt is deposited in it. The woter falls in a high current and brings up the earth from obove and deposits it there.
- 23. Q. After five years whot is the deposit?—It is not entirely filled with silt, because the silt is also taken away by the current thot passes over the ahar
  - 34. Q. Do the bunds ever burst?-Sometimes.
- 35. Q. When an ahar has silted up, so that it won't hold enough water, instead of digging it out, do they over raise a bund?—Sometimes. I do this and have done it. In 1897 I got some money from Government and cloored up the silt ond roised an ombankment.
- 36. Q. Is the practice of taking silt for monure largely followed?—I have been inducing them to do this and been trying to prove its volue. I have succeeded in proving it a nice manure and they have commenced using it.
- 37. Q. You don't pay them anything for taking it away?—No.
- 83. Q. (Mr. Muir-Mackenzie.)—This year you made one big bund yourself?—I purchased that bund in auction.
- 39. Q. Hove you made any improvements to it?~ Yes; in 1897 I made some improvements to it.
- 40. Q. How much did you spend on it?-I spent Rs. 1,000. I spont about Rs. 500 only to raiso ao embankmont.
  - 41. Q. Thot got more water into it?-Yes.
- 42. Q. Did it not result in nn increase of cultivation? Did you get more land under cultivation?-No.
  - 43. Q. You only got better water?-Yes.
- 44. Q. Were you able to increase your rents at all?—No. I won't be able to do that, because the rayats here their permonent occupancy rights.
- 45. Q. Have your rayats got an occupancy right?-Yos.

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- 46. Q. Are not most of the tenants in your district tonants-at-will?—The Maharaja's tenants don't get any occupancy rights—I mean salcable occupancy
- 47. Q. But your tonants do?—Yes, with my sanction which I generally give. In Chota Nagpur occupancy right is permanent, but not saleable or transferable. I was for some time a manager of Tori Pergunnah, and from that and from consulting all the rayuts I have learnt that it is only because they have not got the right of solling or transferring their property that makes them so indifferent.
- 48. Q. (Mr. Rajaratna Mudoliar.)—Cannot the tea-ants adopt on failure of heirs? Cannot a rayat adopt a male heir?—It is not always admissible. He-sides the rayats are so illitorate that they have no idea of this thing at all.
- 49. Q. Under the present custom or law are they prohibited from adopting in case of failure of heirs?

  —I dou't know much about it. I know that a Sub-Judge, Babu Amrita Lai Pal, hold in a case that adopting one are no good as the other sons, but the ease was not decided. It was compromised by the Maharaja. It was rather about to go against the Maharaja and so it was compromised.
- 50. Q. Is there a masonry sluies in your bund for letting out the water?—Yes. I made a dam and I keep that with trap closed and open it in time of need.
- 51. Q. The whole of the water is utilised for irrigation?—The whole amount was never required; half is quire sufficient.
- 52. Q. But you can pass it on?—It goes down four miles only, and irrigates the lands on oither side of it. The Bondoo is very fertile land.
- 53. Q What area is irrigated; how many bighasf-500 bighas.

- 54. Q. Your bigha is how many acres?—It is one-third of an nero.
- 55. Q. (The President.)—That is a kachcha bigha?—Three bighas make an acre.
- 58. Q. (Mr. Rajaratna Mudaliar.)—Is there as more land arailable for irrigation under your bund?
- 67. Q. (Mr. Allen.)—Do the rayats who hold land under the Bondoo bund pay higher reats?—They have got their fixed rent which is never increased.

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- 53. Q. Why do you say the Mabaraja's tenants cannot got occupancy rights?—Occupancy rights they can get, but they cannot transfer it.
- 69. Q. (Mr. Muir-Mackenzie.)—You said you were manager of an estate?—I was manager of some of the Maharajn's brother's estates, the Majaraj Kumar's. estates.
- 60. Q. Were there any bunds there?—I commenced making several bunds, but there was some misunder-standing between me and the Maharaj Kumar, and so I had to give up his service before I could complete these leaves? thoso bunds.
- 61. Q. Did the work you did there result in bringing in any more lands under irrigation?—Yes.
- 62 Q. And did you get any botter routs from those lands?—I turned some fallow land into culturable land.
- 63. Q. Do you know at all how many bighast—I don't remember.
- 61. Q. You don't know how much the zamindar gained.—My rough idea is that I expeaded Rs. 500 or thereabouts, and the annual income was more than one hundred in the next year.
- 65. Q. From the new lands being brought under enlivation?-Xes.

## EIGHTH DAY.

WITNESS NO. 57 .- BABU GOTAL CHUNDRE SEN, Manager of the Palganj Estate in Hazaribagh District.

# Purulia, 4th November 1902.

Babu Gopal Chunder Sen.

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- 1. Q. (The President.)- Is there much demand for irrigation in this part of the country?—Yea, throughout the country.
- 2. Q. How is that want best to be met? What ought the Government to do ?-Make ahars or bunds. There are a great many old ones and about 10 per cent. of them have been silted up.
- 3. Q. Do the ramindars or rayats make them for them-selves P.—They are very poor. The castom is that ramindars generally give away villages in tike for a five years' leave, and after the expiry of that period the mouza or village can be settled on anybudy slee. Un that account the tikadars do not care to make any improvements. In our estate we give tika for 20, 25 or 30 years, but even then the tikadars do not make improvements. Those who are not pour-only two or three estates-do not care for it.
- 4. Q. Could more poor men not get loss from Government to make their ahars?—They do not like the idea of taking losas. A certain percentage of them is taken by the amlas, and the rules for recovery are very strict.
- 5. Q. lu how many years is the sam to be paid hack?-Five.
- 6. Q. If it was twenty Instead of five, would they take loans !- Zamindars are always foad of taking leaus, but they do not always use them for the laprovement of their villages. They are not intelligent and not at all educated.
- 7. Q. Would they not get better reats?—If they make the bunds, then of course they are supposed to get better rents, but I do not think half the amount would be speat on making bunds if there is not some Government control over their action.
- 8. Q. There might he such control? Yes, the rayals would be very glad to have the bunds and the zamindars also. But I do not think the zamindars would be able to make alars without supervision and Government control.
- 9. Q. Why not? The old akars must have been made by themselvss?—Their forefathers.

- 10. Q. And they are not so good as their forefathere? -- No. They are deeply involved in debt and the estates have been divided up.
- 11. Q. Hare you any wells in Hazaribagh?-Yes.
- 12. Q. Are they used for irrigation ?-Only for certain crop--sagareune, potators and garden produce
- 13. Q. Rabi?-No, except in the thean of Gawan.
- 14 Q. 1 suppose the greater part of the coltivation is rice? Yes.
- 15. Q. You think all that is wanted is to put these ahars or bunds in order?—Yes, there will then be no failure of crops, and besides that, a lot of land will be
- 16. Q. If the people made these akars themselves, would they not do it ebeaper than the Gorernment !-- You
- 17. Q. Why should not the raya's with occupancy rights borrow from Gorernment?—because their land is not saleable. They are very poor and their holdings are not certain, because the zamladars and tikadars sasteb away the land from them at any moment; this tamindais would enhance their land. Those who have occupancy rights will continue to hold their land as long as they like, but the practice is that the zamindars take away the lands. The rayats are regarded more as tenants-at-will.
- 18. Q. (Sir Thomas Highars.)—What is the area of your estate?—207 square miles.
- 10. Q. Why do not you put the ahars in good order?-For want of money.
- 20. Q.—Can you not afford to do anything !-No, the estate is involved.
- 21. Q. (Mr. Muir-Mackenzie.)—You say, if these ahars are put ioto repair, there will be an failure of crops. But will they hold water in a failure year?—Yes, because in the Hazaribagh District. I have watched it for 35 yeers; the rainfall varies from 40 to 55 inea year, even in famine years, and it is only when the fall is not well distributed that there is failure of crops.

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- 22. Q. If you have no good rain in Soptember ?-It will be no harm if we have ahars.
- 23. Q. Will the akars still hold water if there has been little or no rain in August ?-- Yes.
- 24. Q. Did you never make any improvement when you were manager of the encumbered exists?—As far as I could. The object of the Act is to pay off debt, and only what can be spared from the payment of debts we speed on improve-
  - 25. Q. Lid you make bunds ?- Yes.

And the first of the second of the second of

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- 26. Q. Did you get more rent on that account?-Of -course we raised the rents and got new land nuder cultivation.
- 27. Q. Did you spend as much as a thousand rapees on one bund?—I spent about Rs. 1,000 in one year when the rental was Rs. 1.35,000.
- 28. Q. Did you over ask to be allowed to spend a little more money on improvements ?—Yes, and the Board was always ready to sunction that amount after the payment of debis.

- 29. Q. (Mr. Allen.) In how many years were the dobta Balu Gonal of an encumbered estate to be paid off P-Fifteen years. Chunder Formerly it was 25, but the Act was smeeded in 1884. Sen.
- 30. Q. You were in charge of all the estates administered under this Act in the Hazaribagh District ? Yes.
- 31. Q. What area was under your administration there? About 2,000 square miles. The area of the district is about 7,000.
- 32. Q. Would it be a good thing if more money were spent on in-provements in commbered estates !- Yes.
- 33. Q. Why ?-Because if, after the payment of debts, the estate is kept under management for some years to make these improvements, it would be most beneficial.
- 34. Q. Does the zamindar gain by making improvements !- Yes.
- 35. Q. In what way f-By increasing the rent and by reclaiming lands.
- 36. Q. For how many years did you administer these estates?—Five. From 1892 to 1896,
- 37. Q. What did you spend on an average in a year on improvements?—Very little; not more than Rs. 1,000.

WITKESS No. 53 .- Mr. A. H GARTZER, District Engineer of Hazaribagh.

- 1. Q. (The President.)—You have been 27 years District Engineer?—Yes.
- 2. Q. flave you ever seen severe famine there!—In 1873-74 there was famine there.
  - 3 Q. People dying from want ?-No.
- 4. Q Had you relief works on a large scale?—We constructed a road, 32 miles from Bagodar to Hazaribagh, with eight bridges and 82 culverts.
- 5. Q You have had no relief works since then?-No, not on such a large scale.
- 6. Q. Have you had anything to do with the irrigation of the place?—Yes, all the tievernment estate bunds and the encumbered estate bunds and those of the Court of Wards are nuder me.
- 7. Q. I suppose you see that they are in good repair?—As far as funds are available.
- S Q. Is there difficulty in getting money?-Yes, caproisily in encumbered estates. At the must we get Rs. 1,00) a year. There was only one create under the Court of Wards (Dhanwar estate) and we made several improvements in that.
- 9. Q. What is your experience of bunds in zomindari land?—They are in very bad repair; most of them silted and breached. To my certain knowledge extending over 33 years. I did not see that any work has been done in these bunds by zamludars.
- 10. Q. Do you put that down to the poverty or the stupidity of the zamindars f.—The poverty of many. The larger zamindars do nothing. In some parts the rayats would gladly pay enhanced rents, because they are so bodly off for water.
- 11. Q. What should be done? All the chare should be cleaned out.
- 12. Q How much silt lies in them?-In one place I have seen ten feet, and other places, fire, six and seven in the basin of the bund.
- 13. Q. Is the silt any use?—They never toneh it; it is mostly sand—the weshings from the upper lands. They should have a little dyke to keep the soil from washing into them.
- 14. Q. Would it be necessary to put up bunds in other places?—First those in existence should be repaired.
- 15. Q. Would not that be enurmously expensive?-Not more than Rs. 150 to Rs. 300 cuch.
- 16. Q. Why do not people take advances from Government !- They are willing to take advances, but they do not know how to manage their affairs. If they took advances and the thing was managed under Government control or that of the District Board, the bunds could be made. They would pay an interest of even two pice in the rupes per annum and pay book in five years.
- 17. Q. Does the Deputy Collector refuse to grant them the monoy P-Most refuse to take, because they do not got the full smuunt of the monoy advanced. Some get about 12 annas in the rupes. It stops in the hands of the mohneries. If these advances were made through Deputy Collectors personally, they would get the whole amount.

- 18. Q. They do not want more than five years?—No. Mr. A. H. The last time they had to pay within two years, I believe. Gantzer.
- 10. Q If the Deputy Collector went out with a bag of rupers and enquired, would a good number take advances from him?—Yes, if he went in time. The last time they went out rather late when the ased had been sown. But the work in their (proph's) hands would not be done properly. The District Board can help in that as in 1897. We had their help in measuring up the works.
- 20. Q. In 1807 there was distress here, but not famine ? -Yra-
- 21. Q. You say the failure of crops in Hazeribagh is by no means the result of scanty rainfull, but due to untimely and irregular rainfull? Yes. They find difficulty just before resping—the hathin period.
- 22. Q. If they had these abars, they would have water? -Yr,
- 23. Q. You ery "a bund once allted or brouched is seldoin or never reprired, breause the rayat looks to his landdoin or never reported, bleass the rayat looks to his land-owner for the necessary repairs, but the landlord in most cases is hopelessly involved in debt." And the landlords ought to be compelled to keep them in repair?—Tes. Because they do not know their interest. If a little water case were imposed on them, it would be better; say, a pice in the runces. They would be very glad if they had water, because it would help them, whereas the road ceas they do not care about. But they take a personal interest in this not ear about. But they take a porsonal interest in this
- 24 Q. With this water cers would the District Board carry out the works ? Yos. Without supervision it is a waste of monor. The work actually done should be measured in every case.
- 25. Q. You say "loans under the Lands Improvement 25. Q. You say "loans under the Lands improvement Lones Art are not taken freely by the people for the extension of irrigation, or reservoirs, owing to the difficulty experienced by cultivators, in obtaining them," and you mention the approxime measures usually adopted in redising them. Yes. You suggest for the encouragement of these leans (1) "the partial remission of advances." What is that—not to take the whole back?—Last time they remission of opening when they did the allowed thom a remission of one-third when they did the
- 26 Q. And (2) "total remission in had years." You do not mean morely postponement and (3) "the extension of the periods of repsyment" ?—"Two years was very short. They want five years.
- 27. Q. Lastir "grauls-in-aid?"—and if advances were given to the rayate clubbed together, a dozen respectable men of each village, they would be more easily realised, because outh would be held responsible.
- 28 Q. (Sir Thomas Migham.)—You were in this district in 1897 and 1899?—Yes.
- 29. Q. Did they have much famine in 1897?-In only one corner of Geomean thans.
- 30. Q. The rainfall was not short !- No, but not properly distributed.
- 31. Q. You did not do any village works?-No, except repairing akars in Government, encumbered and Court of

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Mr. A. H Wards estates. They like that work better than roads, Gantzer, becaese the soil of the latter is very hard.

32. Q. How many people did they have on read works? Not more than 2,100 a day.

83. Q. You had famine in 1899?-No.

34. Q. Short rainfall?-Yes. But we bad hardly any relief works.

, 35. Q. What were they?—Mostly abars in the Government, enembered and Court of Wards estates.

· 86. Q. You never put relief labour on zamiudari estates?
—In 1869 we got R. 1,000 from the Roja of Padma and I re-excavated nine of his ohars.

87. Q. The labour comes from the ramindari estates for the rollef works. When a tank is ones silted up, us one will ever clean it again. Is it worth while?—Yes, they would hold a lot of water.

38. Q. How much water do you want to flood on asrc of lond with three inches of water ?—About 11,000 cabio feet. Then there is the earthwork to clear.

39. Q. How mach would it cost you to clear that earthwork ?—We calculate R-. 2 a thousand.

40. Q To clear enough silt to bring out one flush for on aero you would have to spend Rs. 22?—Not more than Rs. 15 an acre to remove silt 3" deep.

41. Q. That is a great deal to pay for every sere. I quite understand they don't care to harrow money to clear their tanks it it costs as much as that ?—If they got money at 2 pice in the rupee, it would not cost so much. They would gladly pay that.

42. Q. People nover take the silt out for the purpose of monuring their fields?—No, but you can improve the bank with it.

43. Q. Did you clear out a lot of those chars in 1899? - Not many. We get from the Court of Wards Rt. 5,000 and from the ensumbered cetates Rs. 1,000 and from Gorernment estates Rs. 1,600 or Re. 2,000.

44. Q. (Mr. Muir-Mackenzie.)—Did you use all that money in clearing out silt?—In deepening the basius.

45. Q. You did not use it is raising the embankments? In re-sectioning them and raising them in some places, where hero were breaches.

46. Q. You did not increase the height?-No. They could not afford to de that.

47. Q. Would not that have been an effective way of getting more water into the ahars?—The ahors would hold more water by despening the basins.

48. Q If you have a failure of rain in Sentember and 48. Q It you have a minare or rain in semember and Outober, will yoar ohars held any water in October when all the water has been taken out far the September waterings?—They hardly water in September. All they require is to water in October during the hathia period.

49. Q. Not oven if the rains fail?-No.

to. Q. Therefore, if you have good rois in August, you will have plenty of water in the abore in October?—Yes. If for fifteen days they get water at the beginning of the second week in October, the crops will not fail.

51. Q. On the Government estates you made some ohars. Has not more rent resolted from that? -- Until a re-settlement is made they are not going to take any more

52. Q. No new lands brought under coltivation?—Not yet, but at the next rettlement. It is now let to tikedars and they will not take new lands nor uline the rayets to do it. All the estates are new being re-rettled on the rayet wari system.

53. Q. (Mr. Allen.)—When you apoke of the repayments of taken loans within five years, were you speaking of the repayment by instalments or the entire loan?—The entire loan by five justalments.

54. Q. You think it would be a good thing if the period for repayment of the entire loan were postpoued for 20 years?—Certainly.

55. Q. (The President.)—With all your experience of this country have you ever seen any places where you thought a very large reservoir might be made?—I do not think that would do, because the land is so undulating.

56. Q. A point about 80 or 100 feet high?-No, if all the little abars are maintained, there will be plenty of water.

WITNESS No. 59.-Ma. F. A. SLACKE, Officiating Commissioner of Chota Nagpur.

Mr. F. A. Slocks. 3 Nov. 02

No. 192 M R , dated Ranchi, the 5th May 1902. From-F. A. Slaces, Esq., t.c.s., Offg. Commissioner of the Chota Nagpar Division,

To-The Secretory to the Government of Bengal, Irrigo-tion Department.

I hove the honour to reply as follows to Government order No. 1457-I., dated the 10th of December last, for-narding a set of questions framed by the Iudion Irrigation Commission regarding the administration of water-supply.

The following officers were called on by my predeces-sor, Mr. Forbes, to submit replies to the questions framed by the Commission, viz.:—

The Deputy Commissioner of Singblum;
District Engineer of Ranchi;
of Palamau; of Manbhum, and

32 of Hazaribagh.

3. Ou going through the file, I found that the District Engineer of Raushi had expressed his inability to give any information on personal knowledge, and that in the case of Manbhum, the District Engineer being absent on leave, the replies had been enhmitted by the Overseer in charge.

4. I therefore eatled on the Manager, Ensumbered Estate, Ranchi, for replies to the questions, as repards that district, and the District Engineer of Manhhum having returned, I desired him to moke such notes us he thought fit on the unswers given by his locum tenens.

5. Their replies having been received, I now submit, in original, the onswers given by-

(i) The Deputy Commissioner of Singhbom;
(ii) The District Engineer of Palamau;
(iii) The District Engineer of Hazaribagh;
(iv) The Officiating District Engineer of Manbhum,
with District Engineer's comments thereon;

(v) The Manager, Encambered Estato, Ranchi, nod would request that when these are printed, five apare copies of cach may be esut me.

6. The eafety of the crops in this division in years of sconty or irregular minfall depends on the sinto of the ahars, of which the unmber is at present much below what it might be. How to increase the number of ahars and to maintain them in efficient repair are rether difficult questions.

The following matters are involved :-

(i) Natore of tenancy;

(ii) Provision of capital;

(iii) Liebility to increese of rent;

(iv) Provision of the land required; and

(r) System of maintenance.

7. With regard to the nature of the tenancy, the existiog doubts will, in the course of the next few years, be removed, as the survey and record-of-rights is completed.

Removed, as the servey one resord-of-rights is completed.

8. As to capital, the subject admits of amb-division necording as the nid is required by (o) tecants or (b) zemindars. So long as the tecouts have to come into the head station for the money required, and the present system of using peons for realising the arrears is mointained, the repngnance to have recourse to Government for aid will not be lessened.

I would make it the ordinary rule that advances should be given out lossly by an officer not below the grade of a Sub-Deputy Colle tor, and I would employ u similar officer to effect the realisations bimself. The expense, looked at merely as a loan busicess, would be high. But such expenditure is trifling compored with what is speed often for no real lasting good to a district in famine times, for the prevention of which these akars would be of much assistance; rection of which these chars would be of much assistance; and with regard to the ramindars, the bulk of them in this division are speadthrifts. The few who can monage their estates will always, like the ramindar of Contari, in Palauan, be keenly alive to the pecrainry advantages derivable from nuch works, and will need neither aid nor outside pressure. The others neither have the means nor the inclination to undertake such schemes, and they are not. propared to borrow the requisite funds from Government, as they are aware that the results, owing to went of any effective enpervision, would probably be grossly incommen surate with the sums expended.

I am, therefore, of opinion that any real increase in the number of the alars must be looked from the tenantry.

9. In all probability there will be many cases in which a tenant, desiroes of making an ahar, cannot do so, os some land accessary for the scheme is not in his possession.

It will, therefore, be very necessary to devise isome easy method for meeting a difficulty of this kind, otherwise the salami, which will undoubtedly be demanded, may often -prove prohibitive.

10. The two questions about the hobility to increase of reat and the system of maintenance seem to me to hang together. It is plain that the tenant must always have an incentive to induce him to keep the bund, which forms the chare, in order, and to periodeally remove the silt from the ahare. The landlords could not maintain these ahars themselves in order. They would not afford the necessary staff nor would they cope with what can only be described as the wantou thoughtlessness of the villagers who will often, for the calculations at few falls are the calculations of the silter a reminder hand. for the cake of entebing a fow fish, out a zamindari bund across the middle and repair it badly. The result is that next season or so the bund burnts.

For this end, I would suggest that after the expiry of the period for which the land improved may be held subject to no additional rent (by way of compensation for the cest incurred in putting up the bund), the tenant may be called on to pay an increased rent: the new rental, however, not to oxered what the rental of the land would be not the rates next but one below those prevailing for lands of the same quality in the village.

In this way, if the improved lands were first-class in quality, the tenant could werer be called on to pay more than second-class rates for them, and the difference would compensate him for the cost of repairs and induce him not to let the bund get out of repair. I would allow this privilege to a tenant who was not the successor in interest of the maker of the aker, otherwise it would foll into disrepair like so many of such works already have.

11. There rectains, however, another class of works which would be very useful, viz., bunds across streams whereby water is directed by a pain to a series of ahars. In seasons of searty rainfall, these are most neeful, but their number, I understand, is not many. Owing to the want of any general power of combination amongst the tenantry, works of this nature are beyond their means, and but few zamindars are wise enough to undertake such schemes.

Ordinarily speaking, about 45 of these districts are being managed by Government, either as kine mahals or nader the Wards Act or the Encumbered Estotes Act. I thirk myself that more might be done by Government in such estates than has hitherto been the case to introduce seek searces of supply, and I am about to address the Board of Revenue on the subject.

No. 810-R., dated the 5th January 1902.

From-W. B. Thouson, Esq., I.c.s., Deputy Commissioner of Singbhum,

To-The Commissioner of the Chota Nagpur Division.

With reference to your No. 749M.R., of the 14th December 1901, I have the honour to submit the following replies to the enclosed questions set by the Irrigation Committee:—

## A .- GENERAL.

1. The whole of Singhbham, of which I have been Depety Commissioner since 2nd April 1898-

				Inches.
2.	January	•		1.00)
	February			1.33 Avorage of last three
	March .			0-39 Years.
	April '.	•		0·81 ገ
	May .	•		3.82 (
,	June .			8:58
	July .	•		18:49 Normal, as per meteo-
	August			13 04 Tological report.
	September			8 05 (
	October .	•		2·72 j
•	November			0.27 ? Avorage of last three
•	Decomber	`•	•	0.16 ) years.
	Ben.			

3. (1) No.

(2) No. (3) No. Mr. F. A. Slacke.

3 Nov. 02.

(4) No.

(5) No.

- . (6) Yes; from lack of capital for initial expenditure.

  The district consists of three large estates. The owners of two of these, Porabot and Dhalbhum, are unenterprising. The third is the Government Kolhon Estate for impravement in which Government allots ubout Rs. 10,000 annually are forbital than the state of the control of the c nually, out of which about one-third to one-half is annually spent in making bunds for irriga-tion. The raysts are improvident and poor cultivators, and consequently have neither fands nor any strong desire to make improvements in irrigotion themselves.

  - (8) No.
  - (9) Yes; from the undulating configuration of the country, bunds and tanks are the only practicable form of irrigation.
- 4. No such assessment is made at all during the curreacy of the tenants' settlement. On its expiration, the land irrigated is assessed according to its class. The same applies to enhancement of rents of rayats who have extended intention which have a tendent. irrigation (which here is done only by the construction of Lunds) at their own co-t.

I consider this is sufficiently liberal.

- 5. No. Because the people are both bad cultivotors and lacking in caterprise.
  - (1) No.
  - (2) No.
  - (3) No.
  - (4) No. Advances should not be made for works of doubtful utility.
  - (b) Yes.
  - (6) Yes.
- G. No. Except among the rayats of the Kollian Government Estate, in which Government annually makes a number of bunds. This desire is, however, an expression of a wish to have a good thing the well-being of these them nothing. They would not keep the bunds in proper repair after Government P. A. SLACKY, -25-2-1903.

B .- CANALS OF CONTINUOUS PLOW.

There are none such.

C .- CANALS OF INTERMITTENT FLOW.

None such.

## D.-TANKS.

Under this head I include also bunds.

- 28. (1) These are constructed so as to catch the rainfall draining off a considerable area of high lands. In some cases they also contoin springs, but the drainage forms the chiof source of supply.
- (2) In tanks cout is made in the embaakment when water is wanted. In bunds overflow enttings are mode at the ends of the embankment through which surplus rainfall escapes, and is distributed over the area to be irrigated. Should the rainfall fail, the embankment itself is out. In this case the area irrigated is comparatively small.
  - (3) (a) From beginning to end of raine.
- (b) and (c) In these cases the tank or bund acts an economiser of the rainfall. It collects the surplus rain on the occasion of each fall of rain, and permits it to be utilised between the different showers.
  - (4) About 150 to 200 ocros.
- 24. (1) The rayats are too bad oultivators to avail themselves to any great extent of bunds and tanks for this purpose. They are, however, beginning to do so by growing wheat, tisi, and some other crops on laads from which they have already taken a paddy crop.

(2) Practically oot at all, except where the irrigation permits upland enombsoked lands growing rabi and other suab crops to be turned rice-producing embanked lands. Mr. F. A. Slacko.

3 Nov. 02.

A STATE OF THE STA

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**K** 1.

TO THE REAL PROPERTY OF THE PARTY  (3) In the lowest lands a full or osarly full crop may be obtained; in the bigher irrigated lands a part of the normal orap may be obtained. Bunds in this case are not a complete protection against failure.
- ploto protection ogniost failure.

  25. (1) The bunds and tunks are not fall enough to saffold means of irrigation until after the first few showers. Shauld these he insufficient to fill the tasks and bunds before they are needed far irrigation, the value of the tooks need bunds for irrigation its very little. Shauld they fill the tasks and bunds, the value of the latter for irrigation is not affected.

  (2) Very cansiderably. Water is most reeded when the paddy is farming in the year. If the rainfall cease before or of this time, the bunds do not hold safficiant water to affect full protection to the area irrigated by them.

28. No.

- 27. (1) (n) In Ladi, or high embaoked hads, ane-third.
  - (b) In bera, or low embanked lands, one-fifth.
  - (2) (n) Io bidi, double.
  - (b) In bera, one-half.

- (2) & (3) Nil during the currency of a settlement. On the expiration of the settlement, the land is assessed according to its closs, which may have been raised by the irrigation provided.
- 29. Uoually unthing.
- 30. By the persons inderested. Leaving possible breaches in the embankonents out of account, this is practically negligeable quentity.
- 31. By amicable agreement.

No.

32. Yes; however, I consider the manate of this district to be too improvident to admit af encouragement being successful

33. No.; no; ao; by re-excevoting the trak.

### E.-Wells.

Wells are oot constructed for irrigation.

### II

Answers to questions in enclosure to Chota Nagppr Commissioner's No. 749 M.R., dated the 14th December 1901.

1.—The suswers below refer to the Paloman district, where I have been over eight rears District Engracer, and was associated with immuno relief aperation on two occasions daring the period.

S.—The initial rainfull recards ura kept in the Deputy Gtreass as speeds Commissioner's effice, which can F. A. SLACKE.—70-1-1902. best give the information.

3. (1) to (9). -The district is very sparsely populated. The present supply of cattle seems collicion only for present codes.

I have not seen any but ordinary cattle manoro osed, and that to a limited axtent only.

The sail is generally poor, and black cottan is not very

With most of the smaller loodlards linek of copital for initial expenditure appears to be the chief obstacle to extension of irrigation.

In the cause of caquiries by Mr. Carter, the recepte con-sulted were willing to pay calmaged rent or revenue if water far irrigation could be casared.

6.—Doring the had seasons of 1896-97 and 1899-1900 the majority of laan petitions filed were for earthwork in connection with bunds, points, ahars, dams, otc.; a few only for drinking weter wells.

(1) In (6).—It has always accord to me that much may be done to guard against failure of crops by a judicious system of least at the smaller landholders, and official guidance and export supervision to expending them.

I heard an complaints about the rate of interest or the period of repayment, Simplification of the procedure on

that the poorer land-oweers may reedily obtoic loone appears to be all that is necessary.

There is n strong dreire on the part of the people to provide the means of irrigation which they instinctively believe to he the only means of ouving their crops in a had year, ood giving better crops in an ordinary year.

### B .- Canale of continuous flow.

None in the district the physical feetures of which would not admit of such encode helog made economically on my extensive goals.

### C .- CLUALS OF INTERMITTENT PLOW.

None in the district. There are easly a few limited oreas which are mutorally farourchle for this class af irriguico works; hot no such project has yet been carried out anywhere in the district. The possibility of this class of work in a few selected and apparently promising areas was inquired jute, and reported an, by Mr. Carter to the Saperintending Eaglocee (on special duty), Irrigution Eaguiries,

### D.-TANKS.

There is no organised ayalem of tank irrigation is the district, and therefore nothing in formion data for moswering the questions under this head.

23. The method commanly osed to the district is irrigation from adars or small reservoirs af water formed by cartleen bunds thrown across eatohment lasins with a view to intercept the untural surface drainage. There are also more protections reservoirs of water formed by domining up nains and small nadis, but their onmber is camparatively very small.

In the case of small abars the water is led to the fields immediately below by a plip drain ar as open cut is the Lunds. From larger reservoirs poins or claumels are cut to lead the water to fields more or less distant.

The supply of water is entirely dopendent on the rainfall. Timely fall of rain being essential to paddy cultivation, the water in these reservoirs is held in reserve, to be used only when rale lyrigation is fitful or fails altogother to Septem-

Abars or reservoirs commonly made are small, and protect n few bighas lo n few teas of bighas only.

24. Very aften in a year of reanty or nalimely rain three adars make all the difference between a foir crop and no crop at all. In a year of ample raiofall they are generally of little use; that is, in years in which the rainfall is evenly distributed in July, August. September, and Oolober.

26. Not ordinarily, hat of crilical periods when the nuprity in the adars has been exhausted, shallow wells ore dug as a last resource to save standing crops.

Not in the Government estate and in may other clairs. Then they are the property of the incident of the institution them.

F. A. SLACTS,-26 4-1003.

30. Ordinarily such reservoirs require little in the way of repair. Their utility and efficiency as a means of irrigation are necessarily conficed to omail and detached areas anly. This indigenous system appears to be the only ane which is suited to the means of the people and the physical characteristics of the district. Whether it is capable of being improved, largely exleaded, encouraged and guidel by efficial agency so no to give a fair amount of immosity from and seasons, is, perhaps, a question which is worthy of careful consideration.

## E.-WELLS.

Bå. There is an arganisef system of well irrigation in the district to enable the statistics required by the questions to be farmished. Shallow and temporary wells are used in especially favourable tracts which offer facilities for sinking them at a trifling cost. Systematic irrigation fram permanent wells is not practicable, nor would it be profitable over the greeter portion af the district—

(I) Io Hussainahad and Chatterpur thanas, adjoining the Gva district, personnal wells are usually 30 to 40 feet deep; io the other thanas, 40 to 50 feet deep.

(2) In shallow wells, from percolation generally; in deep wells, from springs and pe colation. In a year of drought the spring level af water good down condiderably lower than noval to the bot

fe. (5) It. s er. 112 minight Pringle Pring Pringle Pringle Pringle Pringle Pringle Pringle

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(3) The cost varies considerably, depending chiefly on whether rock has to be pierced through or not, from Rs. 250 in ordinary soil appears to Rs. 2,000, which was the cost of the well, 52 feet deep, 12 feet internal diameter, sunk 30 feet through rock, in the Daltongsoj jeil.

(5) The water is raised from chollow wells by the usual weighted lever; from deep wells, a skin bag, rope and pullay, and cattle power are used.

35. (2) Iu Hussalnabod thana, on the lands immediately adjoining the Kool river, poppy is irrigated almost wholly from shallow wells 10 to 15 feet in dayth. Poppy neltivation would probably be impracticable without such irriga-

Use. 28. (1) The selection of site for a permacent well in a district like Polaman is necessarily a difficult task, inasmach as the presence or absence of rock in the sub-soil makes a considerable difference in the cost.

(2) There is no numeral difficulty in actual construction.
Wells, as u means of irritotion, are not populor, and hence
no such advice or assistance has been sought.

no such actics or assatzance has been conjunt.

39. No. Judged by financial results, well irrigotion would be unprofitable, even it were everywhere practicable.

40. Yes, but only on isolated places where they can busual by the cultivators thomselves of the cost of a few doys' baloor.

They are not of much protection against drought, but they have their uses. In lands otherwise unprotected against a endden temporary failure of rain—natural irriga-tion,—the loss of crops may be staved off by their means for a time.

ATTL CHANDRA BASERIBE, District Engineer, Polamon.

DALTONGANI;

The 30th December 1901.

### C. M. O.'s HEAD CLERK-

Will you please give the overage minfall of each month of the year over your elganture (see question 2 within merked in red penell)?

Please return by noon to-morrow.

A. C. BANERJEE,

District Engineer.

The 1st January 1902.

Besides Daltongaoj thero aro nino other min registeriog, stutions in the district. The rahnfoll records for these stations are not avoilable in this office. They are, I believe, kept to the Deputy Commissioner's office. Into, therefore, mable to furnish the average rainful for the district. Bat I give below the amount of rain registered at station Daltongauj during coch mouth of the year 1901:—

Henth.							Rufufali in luches.
January			٠		•		8.03
Fobrancy		١.					1.93
March							020
April							0.45
May							0.25
<b>Ј</b> ппо							2.33
July							8.03
August							10:12
Soptember		•					9.04
October							040
November	.′						0:03
Decomber							0.00
•		'		То	ini	٠.	36-60

A. N. BANERJEH, Clerk, Civil Medical Officer's Office.

PALAMAU ;

The 2nd January 1902.

III.

Mr. F. A. Slacke 3 Nov. 03.

No. 183, dated Hazaribogh, January 1902.

From -A. H. Gastzer, Esq., District Engineer, Hazaribagh,

The Commissioner of the Chota Nagpar Division.

With reference to man letter No. 749 M. R., doted 14th ultima, I have the benomer to submit replies to some of the questions from personal knowledge. The numbers below refer to the questions:—

### A .- GENERAL.

1. The coswers refer to the Hazaribagh district. My knowledge is derived from an experience extending over 26 years as District Engineer of Hazaribagh.

2. The average rainfall in each menth of the year is as follows, taking the average of the lost five years:—

Month,						Bainfall in inches.
January		,				1.80
Fobruary						1.31
March						0.60
April						0.71
May						2:02
Jane						9.50
July						10.01
Aogest					٠	11.30
· September				٠		9.05
October						2.60
November.						0.05
December				•		0.24
			T	otai		50.35

8. There are obstocles in the extension of Irrigation orking from (1) spersity of popolation; (2) insufficient supply of eattle suited to the cultivation of Irrigated land; (3) insufficient tempty, and frequently on its ten late connecement and carly cessetion; (6) fack of capital for the initial expenditure and of funds for the more expensive onlithation of irrigated crops; (3) uncertainty of tenure, and (9) lost, though not least, the cursed five years thiere system in vegue. (4) The coil is out unsuitable nor (7) is the fear of enhenced rud on obstacles to the extension of irrigation in this district.

A Age as I an agreement

thie district.

A. As far as I am aware, no coboncement of assessment or account of Irrigation has yet been made, beeness very little, or hardly anything worth mentioning, hos been expended by the zamindare on irrigation works for the last 80 years to my certain knowledge. No cubancement of rent is mode whou tenants extend irrigation to their holdings at their own cost. I woold seggest that the principal zamindars of this district be compelled to improve their ahars or reservoirs, as 90 per cent. of them are practically useless, being silted up out brached.

As the seguetty is multipling, it is gave your be apartured.

As the country is undulating, it is very casy to caustruct ahara bunds or reservoirs to impound weter during the raise. An ordinary new reservoir, or askers bund, does not cot more than from 18. 400 to 500; such recroirs ore most areful to cultivators in this district, where excels

These ahara bunds, or reservoirs for storing water, have proved most useful for irrigation purposes in this district, and the mukararidars or myats who have constructed them feel no difficulty whatever in soltivoling their loads in dno time. In the Hearthogh district the evenge rainfall is about 50'35 inches in each year, and even if it were less, it would be quite enough to fill nur ahara bunds or reservoirs.

reservoirs.

The failure of crops in this district is by no means the resolt of scenty rainfoll, bot is due to untimely and irregular minfall. It will be seen from Mr. Forbee has tagnisque minfall. It will be seen from Mr. Forbee that quinque and report that the roinfoll in the first part of the year 1890 was much more than was required, whilst in August and Exptender the rainfoll was neusually scanty, resulting in the wholesale foliate of crops, whilst in 1807-98, though the minfall was below the normal, it was very favourably distributed, consequently there was a good crop.

If water coold be stored, even in small reservoirs, old over the ecuatry, above a dokur, or rice lands, sufficient

Mr. F. A. irrigate it from time to time, i.e., occasionolly, till the end Slacke.

3 Nov. 02. of erops—in this district, even if there was no rainfall during the kothia, the critical period for sice irrigation.

during the hothic, the critical poried for rice irrigation.

In this district there still crief in number of large and small abara bunds, or reservoirs, constructed long ago; and olthough they are not protected by concrete walls, ottone pocking on inner clopes, or by rubble pitching ontode, they nor still intact, though silted up and practicelly useless; and all that is needed is to remove the silt, and to line the escapes with gookks rubble moscory to make them useful. An akara bund ones silted or breached is seldom or ocvor repaired in this district. The rosson of this is that the rayst looks to be landsholder for the necessary repairs, but the landsholdsr, in most cases, is hopelessly involved in debt to spare snything for the banch of his rayst. raynt.

In my humble opicion legislative measures may be adopted to compel the londholders to repair (by instalments) the existing ahara bunds on to construct usw ones, where necessary, by odvancing them money on rates of interest lower than what can be allowed under the Land Improvement Loans Act.

In the creat of their failing to comply with the request of Government in this respect, Government may be empowered to do the work for them, and to recover the cost of the exme from them at low rates of interest.

5. Leans under the Land luprovement Leans Act are not freely taken by people for the extension of irrigotion recoveries, owing to the difficulty experienced by enlitvators in obtaining them, not to mention the oppression mecanes usually odopted in realising them. These leans on a very unpopular. For the oneonregement of these leans, I would suggest the following measures:— (1) partlel remission of advances;
(2) total remission in bad years;
(3) Extension of the period of repayments, and
(4) grants-in-nid.

6. There has been no opportunity to find out this.

The outlivators in the district are most moxious to get new ahara bunds, or reservoirs, constructed, and old ones repaired and elegaed of allt; but they have no fonds to do the work, nor will the principal zamindars assist them in tiding over their difficulty.

Above all, I would onggest the establishment of agricultural banko.

All advances should be made (locally) by responsible officers, not below the rack of a Deputy Collector, after personal enquiry, not depending on any amilah or ministerial officer.

## B .- CANALS OF CONTINUOUS PLOW.

None in the district, nor is the undulating and hilly nature of the country onited for cannis.

C .- CANALS OF INXENDITIENT PLOW.

The same remark as obove.

## D.-TANES.

Tanks are nover used for irrigation purposee in this district.

Their place is simply enpplied by ahara bunds, or

E.-WELLS.

Wells are never need for irrigation purposes in this district, except challow, temporary wells for poppy cultivation.

## 1V

No. 896, duted Purolin, the 14th Jonnary 1903. From-Baby Lalit Bruant Sana, Overson in obsege of the District Engineer's office, Manblum,

-The Commissioner of the Chota Nagpar Division.

The The Commissioner of the Chota Nagpar Division.

In reference to your letter No. 749 M. R., dated the 16th
The replies to the questions were all noted by me
before they were submitted.
I have now gone through
them again. I have nothing
more to add, excepting what
has been noted in the margan
gather replies 31 (3) and 32

b) and (2).

N. G. Busserve.

N. G. Bibrerse, District Engineer. The 18th March 1902,

### A .- GENERAL.

1. The netwers given below refer to the Mansham district and are based upon general observations made in the ordi-nary course of my dottes when trarelling in the interior of the district.

2. A chatement of the average rainfall in each month is nonaxed. This has been compiled by taking the average actual rainfall in each month for the ten years ending in December 1901, as obtained from the register meintained in the Deputy Commissioner's office.

In the Deputy Commissioner's office.

S. There is no regular system of irrigation resorted to in the district. This copes chiefly depend upon the rainfall. The only form of ifrigation is from bunds. The sorface of the country is very undulated. These bunds are generally constructed by throwing earthdykes cores declirities or natural drains or raviners on high lovel for heading up the drainage, thus forming a cost of a recervoir with the natural radges or high lands on three sides and the dyke on this foorth. In yours of country minfall in the sowing season, this water is run out through outs or drains norose the dyke for propering the soil for the sowing or tronsplantation of crops. Similar means are adopted for protection the stemal groups from withering up. This refers to the winter pathly crops only, which is the which crop in the district. Water from the bunds is olso lifted and haled out for tringating enall patches of Jands for the rabi crops. The ntility of such bunds altogether depends upon the size and site of the bund, their capasity and the rabid of the bund, their capasity and the rabid of the vill import that the several onb-questical control of the such and the control of the such and the control of the such and the control of the such as the capasity and the rabid will import that the several onb-questical control of the such as the such

From the above it will appear that the several enb-questions under question 8 cannot be definitely answered. The following, however, may be noted:—

(2) The general condition of the cottle is very poor.

(3) Yes.

(4) No, so far as I nin awore of.

(5) Yes.

(6) Yes.

(7) No.

(8) The tenancy law is not in force in this district; uncertainty of tenurs is, however, no obstacle in this district, excepting in cases of waste lands brought nuder cultivation without regular selfement of the terms of the tenure.

(9) None that I know of.

4 Land which is irrigated—rather brought under enlitera-tion from works constructed by prirate epital—is googra-ly exempted from assessment for five years, after which the land is assessed of corroot morket rates and n concession of six nunus to the rupes is mode in perpetuity to this

occupier.

Tensots, as a rule, seldom extend irrigation to their lands unless the essessments are fixed permanently, purily for want of means and parily for want of encouragement from their laudlords. For encouraging irrigation oren in the form in which it exists in the district, tecanis shoold, it blink, he protected against undue accessment by the landierd. Aly imperfect knowledge of existing provision of the law preront my otoling whether they are liberal; but I am of opioion that the transfer only the get at least an equal share of benefit derived from irrigotion works constructed of this expense. ot his expense.

5. I am under the impression that leans under the Land b. I am under the imprevious tast some under the Lina Improvement Lossa Act are not freely token. This is chiefly doe to an absence of enterprising spirit amongst the nortenthural community generally, and partly to the difficulties experienced both in obtaining and repaying the loans. The general imprevious is that the majority of applicants from roull tracts seldom receive the full smeant they apply for, and have often to pay more than whot may ey apply for, and have often to pay more than whot may doo from them—

(1) The rate of interest should not be more than 6 per cent, per annum, but need not be less than 4 per cent.

(2) I would not recommend remission of interest, excepting in special cases, to be determined by the Deputy Commissioner, as this is entre to have a demoralising effect, and to likely to lead to diversion of funds thus obtained to objects other than the purpose for which the lonn may be advanced.

(3) Same us (2).

A septiment C None in M 23. [3] +

(4) This

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Dr. 1.

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(4) This can be goarded against by not granting any advances for works, the soccess or atility of which is doubtful. For reasons stated in (2), I am not in favour of ony remission, axcepting in very special coses.

(5) This is likely to be a very healthy announagement.

(6) I om not in favour of this. .

6. Na, so far as can be noticed in Man bham.

B.—Canals of continuous plow. None io Manbham, and the questions therefore do not apply to this district.

. C-Canals of intremittent flow. Nono in Manbham, oud the questions therefore do not apply to this district.

### D-TANKS.

23. (1) to (4) Kindly see (3) obova.

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24 to 33. In the absence of any regolar system of irrigation and my obsence of experience to this matter, I am apollo to sobmit proper replies to there questions.

# E-Wells.

- 31. (1) The average depth of o permonont well is 30 feet.
  - (2) Permanent wells depend upon springs. They seldom fail or become too saline.
  - seldom fail or become too saline.

    (3) This depends upon the size, the nature of the soil through which it has to be excaveted, and the depth of sab-soil water. The approximate cost of a reell, six feet in confineting a patient of a reell, six feet in diameter, of the neer-super ring ladder to the saling of depth, excavated through ordinary soil, is Rs. 470.

(4) Cannot eroctly say. I know that wells constructed over 20 years ago are in as useful a condition as regards sopply of water, as they were when they were first excavated. This, however, refers la well-, which are restricted, for dricking woter, and are soldom used for irrigation pornoses.

- (5) The woter is raised by backets and ropes passing round a rough pulley fixed on the top of the well or at the end of a long lever in wonden pole) weighted of one end and fixed on a wanden post.
- (6) Not known.

[7] Not known.

35 to 37. Samo as the roply to questions 24 to 33.

\* To Manthum people attacking the property of the property of the property of the property of the property of the property of the property and to rural tract for growing registation of draking particular, and the property and to rural tract for growing registation of the property o

In coaclasien, I humbly beg to submit that, not having mach personal knowledge or experience in this subject, and the permanent District Engineor being away on leave, I could not sabmit this report earlier. The abuve is based apon notes which I have obtained from the permanent District Engineer.

Statement of the average rainfall of each month for the ten years ending 31st December 1901

	Name of Hoyed.		Sive of Royid,				1872.	1593,	1691.	1503.	1524	1607	. 1609	1870	1000	. 1001,	Arreng monthly minfall during it last reu years.
	1				:	3	•	6		7	9	-	10	11	-		
					In.	ln.	In.	In.	In.	In	In.	In	In	In.	Ia,		
January .	•	•	•		0.00	0.83	000	045	0.00	0.20	0.08	0.81	1				
Tebruary	•	•	•	•	1.01	4.14	150	0-17	000	075	0.25	030	1	1	""		
March .	•	٠	•	4	000	1.87	000	0.79	0.00	1.08	0.06	0.00	1		1.20		
. lingA	٠	٠	•	•	0.40	1.55	0.58	2.74	0.00	084	141	1.53	1	1	0:58		
May .	•		4	-	1.66	6.70	1.71	1.14	0.53	2.12	1.72		1	1.05	1.32		
June .				.	8 89	11:44	12-12	6.63	2.41			8.08	1.93	1.83	2.34		
July .					13.72	19.81	15.09	9.05		4-42	19.03	6.83	8-10	3.92	7.78		
August .					6.67	10.67	14:73		11.24	12.96	12.67	18 03	6.22	10:37	13.05		
September					7:50			1005	11.20	19-48	13.66	6.10	10.83	19.49	11:01		
October .	·		٠	- '		11.28	8.63	6.86	576	5.22	13.74	1039	20:00	11.14	10.05		
Navomber	•	•	•	1	4.61	3-28	1.25	1.40	0.10	5.77	3.20	1'00	1.48	3.13	2.40		
Decomber	•	•	•	-	1.37	0 00	1.14	2:31	0.15	0 30	000	000	000	0.07	0.28		
TAGOILOGL	•	•	•	•	0 00	0.00	0.00	0.00	0.00	000	0.00	0.00	0'11	0.00	0.01		

R.R.-The figures in column 2 have been compiled from the Calestia Gazette and there of columns 3 to 11 from the register many commitments office.

Mandhon; The 14th January 1903.

S. B. SAHA. Overseer in charge of the District Engineer's Office. Mr. F. A. Answers to " questions for Revenue Officers, etc.," in connection with the Indian Irrigation Commission. Stacks. A-GENERAL.

3 Nov. 02.

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1. The answers refer to the district of Rauchi. I have had opportunities of visiting the interior of the district, having been Manager of, the Wards' mod Eccumbered Estates in it since 1896.

2. The enbjoined table shows the average rainfall in the district in each mouth in the year, then average being taken for the last three years :-

		Mestu.												
Than,		April, May. June. July, August. Scriem October, Noven- Decem- January, Februs March.											March.	of the rainfall year.
1		2	•	4		6	7	8	•	10	11	12	13	11
		În.	In,	In.	In.	In,	ln.	In.	Io.	In,	In.	In.	In.	In.
1899-1900		2 89 0 63 1 09	1·03 4·83 2·12	8.80	12:63 7:51 11:81	6°29 15°08 14°18	2:80 15:41 16:43	0°15 410 101	0 03 Avil 0 03	Nil Nil 01	1:66 3:83 Nit	0.74 4.00 0.83	Nil 0-41 1-43	37-08 64-25 49-89
Total	·	4:61	<b>ተ</b> ፡98	18:37	31 98	35.55	34 70	<b>6</b> /26	011	0·1	4:99	5.73	1.87	151-16
Average		1.53	2.66	6-12	10.00	11 85	1156	1.75	03	0-03	1.66	1.91	0 62	50.38

I bave taken the official year, as it corresponds very nearly with the agricultural year.

I bave taken the official year, as it corresponds very nearly with the agricultural year.

3. No regular system of irrigation cotalus in this district. The only works of irrigation are the bunds or reservoits of water, constructed by making embaukments an solar or naimal drains and hill-streams. The bunds get their supply mainly from flow of water during the rainy season from the adjoining hills and high lands, and come to the nee of entitystors in years of seasty or irregular rainfull. They also benefit the lands below by percelation. Water from the bunds is brought into the fields through points or water passages which are constructed on both ends of the embankment. Sometimes the water is taken out by outting the entounkment, the cut here gafterwards filled up. In this district bunds and wells are, I think, the only suitable forus of Irrigation causis will be disproportionately easily, especially as there is excreely any river in the district which contains copions water in all seasons to enable the construction of Irrigation causis will be disproportionately easily, especially as there is excreely any river in the district which contains copions water in all seasons to enable the causis to draw their sapply of water from it. There ore bunds in some villages, but several of them have got eithed ap, and are of no no on present. It will be a good thing if each village gets at least one bund in a suitable place. Some of the villages are hig nod comprise of several bandes. These hambes are practically generate villages, and should each have a bund. The cultivating people of this country ore generally poar, and no cohancement of rent shool be looked for from construction of bunds. Bot their construction by hundrals will increase their income by bringing now lands under cultivatina and by turning uplands into rice-field. It will his innow punctual payment of rent by the raynes in answer to the sub-questions separately, I beg to so bunit that there are sparsity of popularition in some treats solid in all there are s

There is fear of enhanced rent, and there should be a law

There is fear of enhanced rent, and there should be a law to the effect that when the rayat constincts bunds and wells at his own cost, the localized should not be allowed any enhancement on that concount for a pretty long period, any 16 years. The uncertainty remand faiting male helps in the puttra poutradile jeairs in the male line of the puttra poutradile jeairs in the final grante.

Off. Committees.

Off. Committees.

Off. Committees.

tion to the jegirdars of the Maharuja. But this does not tion to the jogirdars of the Mahanja. But this does not affect improvements being made by occuponcy raynts or rayats helding korlar or khanikari lands. There is one obstacle which stands as a har to improvements being occented in this district by rayaty. It is this, that the rayots owning raynti lands cannot construct kunds or dig wells, except with the permission of the landlord. I think that those should be nlaw to the effect that every occupancy rayat will have the right to construct n kund or dig o well on tho land he holds without having to obtain the permission of the landlord.

will have the right to construct named or dig o well on the landlord.

4. Lands nowly brought mader coltration by the construction of bunds or otherwise by privote capital are exempted, according to established custom, and not oscally under written documenta, from payment of rent generally for three years and, in exceptional cases, for opwards of that period annill the lands are actionly brought nader cultivation. When the period of exemption capires, the lands are aresisted in loof line rate of reat prevailing on the village for ordinary Raja's lands, excepting pargua Silli where the assessment is made at 13 or 1, port of the provailing rate of reot, and in pargunas Biru, Bareva, Timar, Hondo, Rahey, and Barenda, where the rayats are not inflowed the privilege of paring rent for newly-made lands in reduced tale. I would recommend that the privilege be extended to the rayats in all parts of the district. The newly-made lands allowed to be held at n reduced rate of rent ore called anga-abound in parguna Sills and korkor elevidere. If nay rayat constructs, with the permission of his landiard, a bund for the improvement of the lands which he already holds, he has not to pay any enhanced reot, but has to pay rent at korkar rate for nplands which are convarted into rice-fields. But cares to which rayats concirned bunds for the improvement of the lands they already holds are very rice, principally because the rayals me paor and gonerally live from hend to nooth, or seen worse, as a considerable number of them often have to borrow money at high rates of interest for porthose of seed or plengle calife. The greeter portion of the hondord, and the surpless which remains is not always sufficient for the year's emenumption. This is why emigration is so general.

5. Loons under the Land Improvement Loone Act me not taken freely by the people for the construction of fundire—the unity form of irrigation obtaining in the district. As they fear thank Government money, I woold met recummend only extension of irrigation of elited

6. The extension of irrigation by the construction of new bunds and wells and re-excavation of eilted and bunds will not injure the existing cultivation. It will rather improve it. The people in this district evince a strong desire to have bunds in their villages.

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Tanks are scarcely used for porposes of irrigation in this district. The bunds take their places bero.

## E.-Wells.

Wells also are not used to this district by coltivotics are rayats for purposes of irrigotion. But I think they can with advantage be used. The residents of the tower of Banchi cod Leherdage and their neighbourhood use wells 3 Nov. 02. 3 Nov. 03.

RINGEI; TRIPUPA CHARAN RAY. General Manager. The. 18th April 1902.

1. Q. (The President.)—How long have yoo known this district?—I have been here 8; months, but I was Settlement Officer 16 years ago for 3; years for administered estates in each district.

settlement Officer 16 years ago for 34 yeors for administered estates in each district.

2. Q. Mr. Mneoochy in his report quotes from your predecessor, Mr. Torbes, dated October 10th, 1901. On page 197 be saye—"My own opinion, stated geoerally, is that Government would not be justified in outlertaking any of these schenes, or indeed any other irrigation scheme in Chota Nnepar." And he repeats that rather strongly. Do you generally agree with him?—To some extent. No irrigation scheme would pay unless the present law is changed. Great difficulty is experienced in Government scatter as regards the maintenance of the hunds made with Government money. In Palanaus especially there are 1.200 of these hunds which are never regularly hept in order, because it is not the interest of the rayats to keep them up. There was no proper local supervicina, but this is now being arganited, and it is hoped that the bunds will then be looked after. If you make it the interest of the rayats to do so by making it illegal to enhance a main's rent on the granual of such improvement, it would be a good thing far the Government to assist the rayats generally. But natified have is changed it windle be a water of money.

3. Q. Is that what you refer to in answer to question X a Z "writh nearly to the network of the towns.

the law is changed it would be a waste of money.

3. Q. Is that what you refer to in answer to question Nn. 7 "with regard to the nature of the tenancy the wisting doubts will, in the course of the next few years, be removed "x-yes. The reyards know that if they make an ober, the landlord will certainly enhance upon the improvement. Consequently they won't do it.

won't do it.

4. Q. Is there any likelihood of legislation being affected?—I think so. At present there is a bill to amend the present Land Tenure Act, and it is to be passed into low this cold weather. I hope that is only a preliminary. A survey and record-of-rights le being made in parts of Ranchi, and from the information which will thereby be obtained the existing Act will be enacelted and a new one brought in which I bope will remove difficulties.

5. Of the levels in a time the ellewed to enhance?

which I bone will remove difficulties.

5. Q. The lendlord is not to be allowed to enhance?

No. The Bengal Tonney Act prevents that with regard to improvements made by rayats for all time. In this part it may be prevented for a certain time only. The principle is the same with a modification. Here you have the kether system which has been very successful. The termong of the fields here has been done entirely by the rayats, the landlords have need tone anything. A man turns upland into rice land by terracing it. The field so made is called a kether or khuahard or oright field. The maker holds the field so made at a privileged rate of rent for a length of time which varies in different parts. Sometimes at la for end and sometimes for a definite period. It would be better to apply this recognized principla to abore made by rayats than to introduce the Bengalsystem. The whole country has thus here terraced and the same result would happen with regard to others if the some security existed.

6. Q. Do you refer to that in answer to question

6. Q. Do you refer to that in answer to goestian 10—'I muld suggest that after the expiry of the period, for which the land improved may be held subject to ne addicional rest, the tenant may be called upon to pay enhanced roat; the new reated, however, not to exceed what the read of the land wood be at the rator next, but one below these preenting for lands of the same quality in the village "?—Yes.

Innds of the same quality in the village "?--Yes.

7. Q. Apparently the grainflar will not horrow money to improve his estate?--Where he has the inclination to improve his estate he does not have the money. He knows that if he horrows the money, it has to be distributed by his servants and not half of it will be speat on the land. He never goes to see his lands. I only know of one landlord in the whole division, who is really keen about improvements. Some wan't allaw the raysts to make only improvements themselves. The landlorath here are always more or less in debt and periodically have to apply to be brought under the Encumbered Estates Act.

The Words and Government Estates and Encumbered Estates cover, roughly speaking, a third of the whole of this division.

8. Q. Some of them, I coderstond, are permanently in the honds of Government. It is not merely that the landlord is in debt?—There are very large Government Estates.

evonent Estates.

3. Q. Arothey held on a rayatwari tonore?—Almost all. Uotil quite recently a very large Government estate in Palanan was let aut to thikudus ever suco the original settlement, but under the new settlement of 1807 it has been under rayatwari.

10. Q. Is there anything to prevent the temats availing themselves of the Lond Improvements Acts and puring their works in order?—They always hove the fear all having their reats cohonced.

the fear al having their reats cohonced.

11. Q. Even by Goverancet?—It has never been said that it should not be. The law allows it. The villagest might be put under thikedars again. Then thikedars would come in and enhance the rects.

12. Q. You think there is nothing for it but this tenant right?—Some system to make it the interest of the reynt to make the hunds and keep them is order is needed. I have seen eases where to get fish; the bunds have been cut by the raynts and then parched a lattle mad with the result that the hunds went the next season. It is not in their interest to repair them pracely.

13. Q. It is really the fear of enhancement and not

repair them properly.

13. Q. It is really the fear of enhancement and not apartly:—That they will work for their own interest is shown by their terracing. Think of the crores of rupees represented by that labour. It is all done by them, because they get a return for their money.

14. Q. In the ald days had they a security they have not now?—They had security for terracing lands which they still have. No laudlord would thunk of infraging that.

13. Q. Are there terraced lands in a better position than the bunds—Yes. The bulk of a rannindar's certal is from the rice lands, and therefore the fewer rice lands a rannindar last the less his routal. Consequently he has a keen interest in including the royms to increase the area of the rice londs.

quently he has a keen interest in including the royms to increase the area of the rice londs.

1G. Q. In reply in question 9 you say—"In all probobility there will be many eases in which a leman, desirous of making an ahar, cannot do sa, as some land necessary for the scheme is until a his onscession." Mr. Horn says they in hare a method on the Soac canals. To scenre land for village channels paid for by the villagers on the Soac canals they have a procedure by which the land is nequired by the land nequisition officer and 10 ner cent, is charged for exhibitineut charges?—"Inst would be much the expendive and much too lengthy. Some simple system is wanted such as that in force in the Kohna. The heodman af the village refers the matter to the Deputy Commissioner, and if it is naste hull it is given, and if it is somebody clee's land it is valued. The raynt who wants to make the bund pays the value assessed for the land required unless the Deputy Camanissioner is able to give the nan omsted some equally valoable land elsewhere. It works very well.

17. Q. On what anthority is it done?—Uoder the record-of-rigids.

17. Q. On what authority is it upmer—cours the records—rights.

18. Q. Is it desirable to have legislation compelling the landlard to keep his abars in order?—No. How are you to caffere it? You would have to leave an immease staff to go raund to see that these branks are being keep in order, and that staff would probably blackmail right and left and certainly live at the exponence of the rayats. To have a working system you must make make it to be interest of the rayat to keep the works in order.

19. Q. Our last witness suggested that there should be news on the land, and that the District Baard or the District Engineer should do the whole of the repairs?—He has all he can da now.

20. Q. Yau might employ another?—How can one may look after all these bunds for a district like this, or for \$,000 square miles in Hazaribagh, 7,000 in

AND ASSESSMENT OF THE PARTY OF

Mr. F. A. Ranchi. Then, if you increase your mea your funds Slucke, will be absorbed in salories, and besides there woold be the dolay and the blackmailing by the lower subordinotes.

notes.

21. Q. You have sent in o paper by Mr. Thomsoo, Doputy Commissionor of Singhibhum, and he mentions the Kolhon Estate "for improvement of which Gevernment nilets about Rs. 10,000 annually, out of which about \(\frac{1}{2}\) or \(\frac{1}{2}\) is anoually spent for making bunds for irrigation." Does that estate pay?—Yes. But there is no recognised working programme. It is simply a case of from head to inouth, If n man wants a band and there is no monoy, it is putoff till the next yeor. I want to have some definite working plon showing for each village hew many bunds ore wanted. wanted.

22. Q. Will that require on officer especially for the purposo?—No, the talisildars con work it aut by degrees.

23. Q. Is a tabsildar capable?—They are small bunds for irrigoting from one cere to chout fifty

bunds for irrigoting from one eere to chout fifty acros.

24. Q. We have had o few projects put before us on a higger scole altogether. Do you believe in them?—I here only seen one, the Pakrahor. I certainly thook that one night be tried. The Nodown possibly. Let one be tried in order to shaw whather this opinion is carrect or not. It is founded a greet deal upon hear-ay among the people. Consequently some authorities say one thing and same another. The people certainly do believe that it such works were they would be of very great assistence, and if one were carried out, we should hove something to point to. We wont some system of utilising the water running away in these nullahs, to fill up the chars in yeors of drought. As to whether there is ony place where a hig lake can be made, there is one, I am told, on the conface of Singhbhum and llanchi, in which a very large amount of water would be stored up. It is a big volley, fed by mountain streams, and has a very narrow opening, which would be embanked and then by means of a chouned the whole plain below could be trigated. The channel would, however, have to be about 7 miles loog. The information was given me by a missionary at Chainbassa. It would irrigate a part of Singhbhum north of the railway line and near Chakardhorpur.

25. Q. Do you think that is worth investigating?—Possibly. I was told there was a great waste of natural anaterial there.

26. Q. Is it a part of the country where they would be glad to have irrigation?—Yes.

27. Q. (Mr. Horn.)—You would want a hig dam?
—I am told the opening is only 300 yards long.

23. Q. (The President.)—Is there any scope for the extension of well irrigation?—None.

29. O. Why not, because of the rocky soil?—Yest to make a permanent well is very expensive. Well enlityation is used only for londs just round the peoples' houses and they do not raine that cultivation so much as the rice.

so much as the rice.

30. Q On the other hand, a well would not fail then in time af drought?—Wells always fail at the beginning of April. My own go very deep, but I had to get water from a lake. In Hazarilagh this last hat wreather the aluele town drew its water from one tank and one well; all the rest had gone dry. One class which does use wells us the Koeries, the professional market gardeners, but they are much more advanced cultivators than these people.

31. Q. Are the people industrious?—They will work hard for them-elves, but not for nayholy else. Drink is the great curse amongst them. They comploin that we put too many obstructions to their getting drink, The Kols me the people I refer to.

32. Q. (Sir Thomas Higham.—You are not very

32. Q. (Sir Thomos Higham.)—You are not very mach in farour of making these small projects that have been examined. Have you any preference?—Ko; hat I would favour one that did not cost moch, One costs 3; laklis. I believe; I would not take that. One costs Rs. 70,000; I would take that up. I would like to take up a selection in Palanana where five projects have been proposed.

33. Q. All these schemes irrigate a great deal of Government land, and the return for them would be looked for oventually in increased rentols?—Plus the less need of cost for famino.

34. Q. How long would you have to wait for the increased rent?—The rayats would agree to pay at once with regard to lands already under rice cultivation and which were improved by the work. But with regard to other lands which land to be terraced or otherwise rendered lit for rice cultivation, a certain period would have to be given before the cohanced ront could be demanded. It would depend whother

the Board of Roycaue would occept it. The Boord of Revonue might say, as they have already said, that it is not odvisable to take on icorease of rental during the currency of a sottlement. They would, I understand, postpone carrying out these schemes until the present settlement has expired.

stand, postpone carrying out these schemes until the present settlement has expired.

35. Q. That is, in 10119—About that. They have nover expressed only opinion edecrsé to these schames themselves, simply as to the time of carrying them out. The Boord have been told that the people are willing to pay now.

30. Q. What is the Board's objection? De they think that if they woit till the end of the settlement, they could raise the reats to a greater extent?—No. It does not please them. A settlement has been made and the rentals fixed, and hence it does not seem right to the Board for 16 years to step in now and miss the settled rent, because of improvements made daring the currency of the settlelocent.

37. Q. Would it not be n good thing to carry the

currency of the settlement. Indeed aring the currency of the settlement.

37. Q. Would it act be n good thing to carry the schemes out at once even if the rents were not raised for, when the time comes for roising them, you will have hed a little experience to go on as to the value of the works?—I should say, corry out one, whether you raise the rental or not.

38. Q. You do not think you can raise the rental directly you have constructed a work before you know whot it is going to do? You might put it up to more than the rayats could ps?—I would not take the increased real from the rayats until it was shown to be of some benefit. The enquiries would not take long. These small schemes do not irrigute such large expenses of country.

30. Q. What about land of which Government is not the landlord?—I understond the zamoudars would contribute part of the cost.

40. Q. Would they?—They say so.

40. Q. Would they?-They say so. .

41. Q. In the form of taking a lean for it? A part of the cost would be debited to them?—Possioly, It depends so whether the man is impreunious or not.

42. Q. There would be no question of a water-rate in that case? They would be cattled to their shure of the water in consideration of the cootribution they mode?—Yes.

43. Q. Yoo think the moin thing in this district is to increase the number of abors through the tenants?—Yes,

41. Q. The ioducement to the tenants would be that their rent would not be raised—for low long?—It all depends on the amount of work the man has done and whether you adopt the principle of the test of Bougal or that which holds lecolly in the case of kerker.

kerker.

45. Q. You propose that at the expiry of the period, for which the kind may be held subject to no additional rent, the tonaints may be called on to pay an increase of rent?—Because that is in cooformity with the existing system of terraced londs.

46. Q. Ho would por a less rent than the rayet would who had not made the lands, who succeeded to conclude class labour. Would that be a sufficient inducement—Yes, as you see by the crares of rupees represented by the theraced lauds in these parts.

47. Q. Would you give them some right and privi-leges to make ahars:—Les, I would give them some vested interest in noking these ahars.

48. Q. Hove they not such rights?—Not that I am aware of. They run the danger of having their rents enhanced.

49. If they lind these rights, would they make them?—I don't say you would have the country covered with ahars at once. It takes a long time to get ideas to slak into their heads and to renhzo a change.

50. Q. You think they are really prevented?-I think so.

51. Q. They want some preuniary assistanct?—They have found money of their own to tooke these torraced rice fields. There are a loons for this.

52. Q. You don't think they will depend on Government for loans?—I don't think so to any great extent. If they have been able to work these fields without loans, why should they not make petty bunds, etc., without loans.

53. Q. Have you started onything in the way of agricultonl banks?—They are jest legianing. I cannot say anything definite about them. There has not been time enough to judge of them yet. They have ndranced out the money that has been lent to them, but the time has not yet come for the repayment of the first instalment.

54. Q. They have advanced money for improvements?—It is supposed to he for improvements.

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55. Q. How long have they been started?—Some have been started in May and some in June.

56. Q. Who manage them?—The people themselves:

57. Q. The landlords?—The heedmen of the villages;

the leading rayate of the villages.

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58 Q. You have got them in overy district?—No. We have not got them in Singhhum; we could not have them there; the psople are too illiterate. We have got some in Ranchi and some in Hazerihagh; these are all that I can remember. I don't think there is one lere (Purnin).

59. O. (Mr. Muir-Mackencie.)—If I understand you correctly, Mr. Slocko, you think the zamindars are not clickly to make these improvements—not anywhere, not in any district?—Yes. You may find an individual like the zamindar of Untari doing so, but there will not be many others.

60. Q. You mean not generally, not for instence Palaman?—Well, the Itaja of Chalupur may can out some; he is a good laudlord.

out some; he is a good landloot.

Gl. Q. I understood Mr. Lyall to take a more hopeful view. He seemed to think that the zamindars, if they were oble to raise their rents, would see the adaptatage of making these improvements?—Why here that they done it before? Instead of this they are runting into delt. One can only say the proof of the pradding is in the eating of it. There is the fact that at present you have two of Mr. Lyall's most influential zamindars who are likely to have their estates brought under the Encuobored Estates Act too. They are all reckles—at least the bulk of them.

C2. Q. Mr. Lyall's view seemed to be that if they got advances given to them by Government, they would easily take the money P—They would take them.

63. Q. And would spend it on improvements, ho-cause they would be numeritately recouped, sometimes getting as much as 75 per cent. on it P—Then, if n man-could do that, why not spend bis noney on these pro-fitable nuprovements instead of recklessly getting into

stable improvements instead of recklessly getting into debt?
61. Q. He understands it is renumerative. In one of the Court of Wards Estates, in which they spent list 11,000 on improvements, they raised the rental from its. 13,000 to its. 25,000?—I have not get the figures. These improvements not very renumerouse as I have mentioned. They are so remunorative that the Untari zamiadar will not allow his rayata to carry out any improvements. He makes them all himself.

65. Q. (The President.)—There might be a respect-able zamindur who succeeds to an Encumbered Estate?—It is quite possible, but there are very few such

60, Q. (Mr. Muir-Mackensic.)—There are considerable areas under Government Estates?—Very large.

67. Q. Arr you at all satisfied with the amount done on them :- No.

(3), (). Do you consider that oil that could be done has been done?—By the rayats?

69, Q. By Government with the object of increasing its rental?—It has pont money and enhanced its rental in consequence.

70. Q. I understand you to say there are only small improvements?—Because they are only small works. You put up a bund by which five acres of land are irrigated and an increased rental obtained. Government does this. But the difficulty comes in with regard to the maintenance of these brads, which the people themselves will not do.

themselves will not do.

71. Q. On account of the difficulty of maintenance you don't think causideredle profit would be mode?—
f would ruther have the people do it themselves and keep the profit to themselves.

72. Q. The more underlying you have going about in an estate, the worse it is for that estate. We are about to introduce a system into the Government Tolanam estate by which the headman in each rillage will get a little piece of land in return for which he must among other duties look after these bunds. Of course I ceanet yet say whether it will succeed or not.

not.

73. Q. So that oven in Government estates you would infinitely prefer to see improvements in alars made by the tenants themselves!—Yes.

74. Q. You seem to me to prefer a temporary exemption from advancing the tonants' rout to the permanent exemption as being more in accordance with the custom of the country!—Yes.

75. O. Are you quite clear that would be a sufficient inducement?—Yes, because of the example of the terraced lands here.

76. Q. How far have the tonants at present in Chota Nagpur got occupancy rights?—It doponds on the will of the landlord, but they have got it under the law. If a man cau prove he has been continuously paying rent for a cortain bit of land, he has got the right of occupancy in it. They do not know their rights and it is difficult to prove them. If it cames to a survey and a record-of-rights, you will find that the bulk of them really have occupancy rights. Mr F. A.

the bulk of them really have occupancy rights.

77. Q. Has there been not record-of-rights made for the Government estutes?—Yes.

78. Q. Have they get their occupancy rights in these extates?—Yes. The Government usvor ejects their tecants like private zamindars do.

79. Q. They are liable on the Government estate to enhancement of rent nt the conclusion of settlements like other occupancy royats?—They would oven in Beugal under cortain conditions he liable for enhancement of rent.

80. Q. Is there any danger of these chors proving seless in a famine year by heing exhausted?—Yes.

Si. Q. The evidence on that point seems to me to be a hatle conflicting. The has two witnesses have been most emphate in decloring that they will hold water in a bad hother. The has we witnesses have been most emphatic in decloring that they will hold water in a bad year, nules there is some source to replenish them, they would not.

82. Q. That is to say, that soust he connected with one streams?—Yes.

some streams ?—Yes.

83. Q. Is it not likely that if the ohnes are in good condition and ne act blocked with silt, likers would be sufficient rain to fill them?—Yes, but then a great deal depends upon the time when the rain falls. It might fall in a suitable moath and then it would be oil right, and it might fall in a non-suitable moath and then the abuse would be dried up.

and then the chars would be dried up.

81. Q. Say you had 20 nebes of rain up to the middle of August and none after that, would the chars be empty:—No, I do not think they would be a lectan amount of water in them. But if your rain fell heavily in July, and you had morely scaoty showers in August, then "no."

ors in August, then "no."

53. O. You have pointed out how the advances, if made to the zamindors, would be misappropriated. Do you think there would be no similar danger if they were advanced to the toaanty?—Of course there would be in some cases, but the amount ribed would be naked for ndvances rould be very little. The rayats do not like teking advances from Government, because of the conditions under which the sums ere reclized. If the system were improved, then you might have more demands.

20. Q. With that chengo of system would you be able to dispose of any considerable sum?—I tlink so.

able to dispose of any considerable sum?—I think so, 87. Q. How much do you think you could dispose of in your division?—I should think we could dispose of four lakhs a year easily. The needs of Bougal are never met by the Government of India, I think I om right in soying that the amounts asked for by the Government of Bengal are nover granted by the Government of India.

ernment of India.

88. Q. (Mr. Rajaratno Mudaliar.)—Would you like to see the trate of interest reduced from 62 per cent. to 5 per cent. as in Madras, and the period for repayment extended from 20 to 30 years? Would that afford a greater stimulus?—I think not, because the 62 per cent. is so very little as compared to what they pay their native maingians here, and then 20 years seems to me quite long enough. If you have a proper system of intstribution and realisation, I think 20 year and 62 per cent. is fair enough.

80. Q. As regords the system of distribution, would you employ officers of the standing of Doputy Collectors?—I would employ grazetted officers of the lowest grade to go out leadily.

90. Q. What does Government may for the money.

90. Q. What does Government pay for the money?

91. Q. Then the difference between 63 per cent. and 4 per cent. ought to cover the cost of any additional establishment that may be employed?—Then you have to meet losses. If the crops fall and the mon run away, there is nothing to be realised from them and the amount has to be struck off. I have never soon any balance shoot struck, but I do not think it is a poying husiness ta Government. After you take your 4 per cent. away, then I think Government loses.

92. Q. Then, as regards realisation, what are the hest means? You have no village agency for that?—Yes, in several of the districts here, we have a village agency for thet. We have a recognised headman in some places, he is called a movada and in other places

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Mr. F. A. ho is called a mauki. Ho is the recognised headman Slocks. of the village, and you coo work through him.

93. Q. You said you would prefer to see abars con-otructed by the tenants. I suppose they will be able to construct ohors may in their num heldings. When an nhar folls in another man's helding on they likely the combine?—No. There is n want of combination

among them.

94. Q. In such cases whot is to be done? Government, I cupped, englit to step in in such cases?—If it were absolutely necessary, they would do so. In a country administered like the Southel Pergunnahs the Sub-divisional Officers call the principal men together and get them to combine and carry out this wark.

95. Q. As regords the privileged rates of rent; that so far has octed as a stimulus in inducing the people to terrace their londs?—Yes.

96. Q. You proposed to extend that system to ohors ?—Somothing unologous to that system.

96. Q. You proposed to extend that system to ohors?—Somothing analogous ta that system.

97. Q. Wa horo something similor in the Modras Presidency, but there a condition is attached that if the works are not maintained in proper order, the concession is liable in he withdrawn. Would you adopt that system here?—No. That implies that somebody should go round, which generally ends in eight ouns in a rupe being taken and a lot of other evils. If it is not in a man's interest to do this, he goes away and the land is let to another person whose interest it will be in do in.

98. Q. The tonants here have no saleable interest?—No. Woll, at present there is nothing against it, except that there is no mention made of the transfer or sole of ready heldings in the Clutch Nagpur Landlord and Tenants' Act. Up till quite recently they have not had any right in soll their londs, but the practice is goddinily and very slonly creeping in. In the anneaded Bill that will be introduced in the Council, I understand a provision will be introduced to probabit the sale of rapid heldings altagether. Hitherst this practice has never been recognised by anylody, but by their contact with more highly advanced roces the people are gradually coming to imbile the idea that they have a right to sell their holdings, which is not good for them, because they are very that the present ones like an one-approach construct of the present of the part o

99. Q. Mr. Twiddell, in answer to questian No. 10-says that "an irrigation cess like an embankment cess might be imposed to provide funds for the construction and maintenance of tauks and pains". Do you ap-prove of that proposal?—No.

100. Q. (Mr. Allen.)-You know the Saran Dis-let well?-Yes.

101. Q. For bow lnng ?-2j yeors.

102. Q. How long agn was that?-I left it in the middle of 1896.

102. Q. How long agn was that?—I left it in the middle of 1896.

103. Q. A good deal of ovidence has been given before the Commission as to the advisability of improving what are known as the Saron Comals and recouping the expenditure involved by imposing a water cess on the district as a whole. What would be your opinion?—If would no quite unfoir, because the bulk of the londs in Saran would never get any benefit from the water, and to assess them because of the improvements made in these canals would be quite unfoir. The district is shoped like this (witness explained how the district was shaped in the map and also how it would be impossible for the lands he referred in getting a pice worth of benefic out of any improvements that would be made). Continuing witness soid—Yim bove spent seron lashs of rupes on these canals and nothing has been done, and if you spend another seven in twelva lakis, nothing will be done, and you will be spending good moner after bod. The year before last I was Revenne Secretary and the point canon pobout the opining of these canals. The District Board, the Collectir and the Commissioner wrote dawn to Government to pass orders to have these opened. Mr Buckley was thea Secretary to the Gavernment in the Public Works Deportment. He drow up a very good note showing how hunch had been lost in the post; but then the pressure was too great and the order was passed to open tiem and then what was the result—4,000 acres only were irrigoted.

104. Q. It wos also suggested that the water level would rise and so wells in thier ports of the district would rise and so wells in thier ports of the district would rise and so wells in thier ports of the district would rise and so wells in thier ports of the district was the result rise and so wells in thier ports of the district was the result rise and so wells in thier ports of the district was the result rise and so wells in thier ports of the district was the result rise and so wells in thier ports of the district was the result rise and so wells

104. Q. It was also suggested that the water level would rise and so wells in other parts of the district would benefit olsa?—That is very doubtful. If the water level rises, it would mean more malaria. If you have a water level very close to the top of the district, it means a molarious district.

145. Q. (Sir Thomas Higham.)—What is your opinion about these conels?—What do you think is wanted?—Nothing.

100. O. (The President.)—The argument was that the silt clearence was not properly regulated and that the water when it was given came too late to be an any use, and that the canels only wnoted to be put under proper ogency—If the people of the district helieve that, why do not their own District Boord toke it up.

toke it up.

107. Q. The District Beard advocated it?—But they don't advocate the spending af their own money.

108. Q. (Mr. Muir-Mackenic.)—They said the district would be willing to pay?—It has not been levied yet. These men who said so were not speaking on behalf af the rayats. I doo't think you would find that the rayats. I doo't think you would find that the royats would egen to pay an extra cess.

109. Q. (Sir Thomas Migham.)—They send water down here (indicates nn map); dan't they?—It is not of inuch use. The people who get most benefit from this water here ore the focturies.

110. Q. A good many people get benefit from the focuries, because the lectories are clongside of that nullah?—Yes, there use to be fecturies. There are deserted factories along there now.

desorted incurries along there now.

111. Q. (The President.)—But there was much absolute ucanimity of opinian from the Commissioner downwards that this place would have its salvotion worked out?—If they are so ucanimus about it, they ought to urgo the District Boori th find the monoy required and look after the scheme. Then you will full they won't burden themselves with it.

112. Q. (Mr. Allen.)—About this Eacumbered Estates Act you say about non-third of the division is under Government administration?—More than one-third. One-third is under the Encumbered Estates Act.

113. Q. Do ynu consider that sufficient money is speut an improvements in these estates?—No.

113. Q. Do you consider that sufficient money is speut an improvements in these estates?—No.

114. Q. Whot is done?—There is na warking plon; an system whotever, and everything is subordinated to poying aff dolts; whereos under the low (section 4) unprovements come before paying off debts.

115. Q. What you think should be donn?—I think myself that when a scheme is sent up to the Board for approval, it should be made subject to revision or report of the Collector or Deputy Commissioner when he knows the tract and is in a position to say how much is required for improvements. It is said in the Act then application shell not ordinarily be subolited by the Commissioner without the coasent of the Lioutenaut-Governor unless the debty con be liquidated in 15 years, and that "ordinarily" is generally not read, so that in scheme is sent up unless it is made and that the debts can be ilquidated in 15 years. Therefore everything is subordinated in the liquidation of debts, whereas the law says the cost for improvements should coince before the liquidation of debts. Therefore there should not be any great stress loid upon the length of time for which the estate should be retained under Government management, and the scheme should be accepted subject to the possibility of its being revised when the Deputy Commissioner knows actually the needs os regards improvements for the porticulor estate.

116. Q. (Mr. Muir-Mackenie.)—I understood von to

needs os regards improvements for thot porticulor estato.

116. Q. (Mr. Muir-Mackenzie.)—I understood you to say that even an estates managed by Government you would prefer that the improvements should be unde by the tenento?—Yes, if you con get it done by the tenents?—Yes, if you con get it done by the tenents. You could not get it done now. For instance, as I said just now, there is o want in combination animing the tenantry, and then of course you will have several cases in whilet the worlds ore too big for them to carry out. If you choose to wait your, and years, then the rayots themselves moy do it; but if you don't care to do that, either Government must step forward in Government estates, in Government must take the place of the proprietor in carrying out the improvements in the enclimbered estates. There was a case came up then ther day in a very hig nlar—an old one which had cost Rs. 4,000, and you could not get the rayats to combine in tolar the silt out if it unless you redneed their rosts. Similorly, there are very many other ahors silted up, which you could not expect the rayats to attend to but the zomindars. I am having them included in the famine works programme, so thet when any famine comes, they shell be taken up as famine works.

117. Q. Is it the case that a great number of estates in the interior comes that the states in the string comes to not in the suffer her parts to the string the string comes to not the sum or suches.

117. Q. Is it the case that a great number of estates in this division come at one time or another under the Enembered Estates Act?—Yes, or under Government management. You have got 44 or 45 per cent of this division now in Government hands, and there is another hig estate coming in shortly that will increase it more. In this division ? of the estates are in Government bands.

III. Q. If its of that, the on by the Enumerous of the order of the or

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118. Q. If a more liberal policy is parsued in carrying out improvements in these encumbered extrice, a greet deal of good will be done?—Yes. As matters stand, the only good, as for us I can see, that is done by the Encumbered Estates Act, is to prevent the people coming into the bonds of ulion landlerds and to pay off the oreditors. There are many eases in which estates after being released have ngain bent taken under the Act in a few yeers time. Proprietors during the time the estates is being managed surreptitiously berrow money at heavy interest and on the estate bang released confirm all their engagements with the result that they are swamped and then apply again to Government to be taken back under the Act.—119. Q. (The President.)—This is a policy for the protection of insalvent landlords?—It saves the people meinly.

120. Q. (Mr. Muir-Mackensie.)—On the Gororment extates if the enhanced rents are maintained, is it not surely the duty of Government to repair these extets?—That is new being dene; efforts ore new being made to keep them in repeir, but it is not the duty of Government to repair nat-holes. If nt present there is a rat-hole in a bund, the people do not try to closs it, and so by degrees it ollarges, and if nething is dom, it gets bigger and bigger till famely the bund is destroyed. The motive's business will be to see that the raysts carry nut at their own cost potty repairs like thet. Big repairs will be done by Government.

121. Q. Is it not necessary for the make to have not his back my compulsory provision?—No. A man would not be appointed as makto if he had not enough neval force ar power helind him to command the raysts.

3 Nov. 02.

# NINTH DAY.

### Calcutta, 6th November 1902.

WITKES No. 60.-RAI DUBOA CHARAN CRAKBAVARTI, Henomry Assistant Engineer, Edilpore, Burdwan

(Replies to print	Rai Durga	
A.—GENERAL.  and Hooghly districts commanded by the I am in oburga of the Edilpur Irrigation and irrision cinas last four years.	(3)  (a) From 16th June to 16th November.  (b) From 1st July to 30th Ostober.  (c) Pram 1st July to 30th September, i.e., long as the water level in the river	Charan Chakravarti, as 6 Nav. 02,

19.

1. Bordwan : Eden Canal. I Revenue Sub di

2. The monthly average rainfall eletement of the year 1003-1901 is given below:—

	Mooth.				enual stations, one in the Bordwase district and the other in the Hoeghly district.		
ı	April	1900	•	•	•	. 3·12 . 4·99	
	May	25	•	•	•	880	
•	June .	25		•	•		
	July	11	•			. 9.66	
	Angust	,,				. 11.20	
	September					. 21.03	
	Oatober	39	•			. 0.60	
		19	•	•	Ĭ	. 0.00	
٠	Novamher	21	•	•	•	. 0.20	
	December		٠	•	•	1.18	
	January	1901	•	•	•		
	February	29				. 2.27	
	March	11		•		. 004	
				Total		69.89	

(1) No. (2) No. (3) No. (4) No. (5) Yes.

o.

ce. The supply generally fails in October and
November, when the canal weter is most needed,
there being no pucces aniout across the river
Damodar from which the supply is received.

(7) Ne. (8) No. (9) Ne.

There is a strong desire evinced among the people to bave means of irrigation extended.

# C .- CANALS OF INTERMITTENT FLOW.

2.
(1) There are two elnices in the Damodar left ombunk-ment through which Damodar water is sent down to the Banka nata by two channels. The Benka river is provided with on enices and beed elnice through which water is admitted into the Eden Canal.

(2) There are two distributaties and some nadis which are fed by the Eden Canal. In the distribu-taries there are regulators and permonent entitles through which water is distributed to the land.

(i) The irrigation increases the value of the produce of the land by increesing the yield.

(3)

(a) By increasing the yield one-and-a-helf times (vida Form No. 74 S. W., 1899-1900).

(b) By increasing the yield doubly (vide Ferm No. 74 S. W. of 1900-1901).

(2) By the too early occeation of the supply, quarter of the value of the irrigation is diminished.

 Approximate estimate of the increase in the tetal nunual value of the produce is Rs. 17 per acra. 17.

(1) Annas fifteen ond pies one-and-a-half on the area ordinarily irrigated.

(2) Nil.

(3) Niz.

18. The only private expenditure necessary to bring the water to the field is by constructing village channels; it is generally incurred by the tenant, and he has ne accurity for recompment. Unfortunately there are few village channels.

recomment. Unfortunately there are rew rillege channels.

12. No damage resulted to the people, nor detarioration to the soil from irrigatine from any canes. Bother, the allorium carried by Damedar water has improved the quality of sail of the tract irrigated by the Eden Csnal. Eden Canal system serves the purpose of irrigation as well as drainege of tha land irrigated from it.

as draioege of the land irrigated from it.

20. Annual maintenance estimate for repairs and silt-clearance, etc., is sanctioned by Government. The approximate annual cest per acre irrigated is one rupe. exclosive of cost of establishment and tools and plent. The system is not working fairly well, and new legislation is required binding on the individual onlivators to pay water-rate and expectating a special estificate efficer for the Eden Conel (crize Revenue report, page 80, of Eden Canel far 1899-1900).

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- 1. Q\_(The President.)—Have you been a long time fu Irrigation?—Yes, nearly eixteen years.
- Chakrararti. 2. Q. Do you know the Burdwan and Hosphly Districts
  6 Nov. 02. rery woll?—Yes,
  9. O. How lose have van been connected with them?—
  - 3. Q. How loag have you been connected with them?
  - 4. Q. Then yan are naw in charge of the irrigation?—Yos, the Eden Canal.
  - 5. Q. You said in reply to question No. 6 there is no strong desire among the people to have works af irrigation extended? Yes.
    6. Q. To what extent is this desire strong? I suppose they are ready to pay for it?—Yes. They are ready to

  - 7. Q. How much do they pay for irrigation by the Eden Canal?—They pay at present variance rates; they have long leaves, season leases and fluckings. For long leases they pay 5 annus for a bigha.
  - 8. Q. (Sir Thomas Higham.)—What do you call n bigha?—Thoro are 3 bighos to the ucre, or, ta he more precise, 3,025 bighas represent an nore.
    - 9. Q. That is nimost n rupeo nu acre?-Yes.
  - 10. Q. (The President.)-That is far long leases?-
  - Q. And for season leases?—For season leases they
    pay night unuss per bigha, and for one flashing they pay
    four unues per bigha.
  - 12. Q. For long leases they get water as long as the canal is ranning?—As long as the crop is ripening.
  - 13. Q. After the crop is ripe, da they get a second capply ?—For this they make separate agreements.
  - 14. Q. What is the rote for rabi?—One rupes per bighn; that is, three rupees per acre.
  - 15. Q. Does my person take it at that rate ?- Yeo.
  - 16. Q. Then why do they not pay more for the kharif?
  - 17. Q. They take this water every year?—Yes; very generally new-a-days. Every year latterly there has been a deficient rotufall. This year ulso they had no roinfall in
  - 18. Q. Did not the rain fall last mouth ?—Very little; only 105 in the whole of the mouth of October.
  - 19. Q. You do not seem to increase trigation in the Eden Canal ?—It cannot ho increased, hecause there is no regularity in supply from the river Demudo.
    - 20. Q. Do you get the fall duty on the water ?-Yes.
  - 20. Q. Do you get the fall duty on the water r-xes.
    21. Q. Is all the weter used every year?-Yes. The
    difficulty is there being no weir; the supply in October is
    reduced very considerably; we have at present 26,000 acres,
    and this at the duty af 80 acres ecquires \$25 cubic feet of
    water per second. There is no hepo of dovelepment. The
    average supply during last Oatoher was \$5 cubic feet per
    second. I have got a statement which I have prepared second. I have got a statement w
  - 22. Q. How are these taken?—From the sluices by means of the claice formula.
  - 23. Q. (Sir Thomas Highom.)—How much water have you to supply ?—There are 26,000 long leases in force.
  - 24. Q. (The President.)—You say you here regulators in the distributaries? Yes.
  - 25. Q. And you work these regulators onlirely for the sake of irrigation?—Yes.
  - seke of irrigation?—Yes.

    26. Q. Was not the canal made as a canitary work?—Yes; the first object of the Eden Canal was to sapply drinking water; afterwards, whose the canol was re-opened in 1881, the demand for irrigation rose, and from 1882 they are trying to work by means of an open ent. We are finding that gradually the mine entrance to the channel is heing slitted up and the sapply entering the council is failing, so the sapply is very limited, and therefore satisfactory irrigation is not going an.

    27. Q. Which has the first thing the council of the
  - 27. Q. Which has the first claim, the Sanitary Department or the Irrigation Department?—The abject of the canal was to moke it a senitary canal, but we cannot do that; we have already undortaken some long leaser, and we are bound to supply water.
  - 28. Q. I cannot anderstand how you can take long cases?—That I canaot answer.
  - 29. Q. Since how loag have these loag leases been given?
  - 30. Q. For the last ten years?-Yes.

- 31. Q. Has there never heen any complaint from the Sonitary Department P—Na; we are trying to supply whenever possible for drinking purposes.
- 32. Q. Your long leases are at 15 ennss per nere?-
- 33. Q. I see Mr. Maconchy calculated on having long leases at Rs. 1-8 per acre?—Xes, that is the view of the people; they are willing to pay at the higher rate if the sapply can be made satisfactory.
- 34. Q. He estimated that there would be n revenue of Rs 1,44,000, or for each section only Rs. 28,831?—Yes. That is because there is na weir or regalotor.
  - 35. Q. It ultogether dependa upon the weir?-Yee.
- 26. Q. The weir will cost about 8 lakes of rapees?-
- 37. Q. Have yan over seen anything like a famine in this district? Have you ever known people dying from want of food?—No.
- 38. Q. Hos it ever been necessary to open relief works?

  The materiol condition of the people is not good. Some relief works were taken in hand.
- 39. Q. Bat not for famine?—No, because no death or anything of the aort has taken place in Bengal on account of famine.
- anything of the nort has taken ploce in Bengal on account of famine.

  40. Q. What is your opinion aheat a weir? Is it necessary to have this werr across the river?—Yes. I here a little note if I may be allowed to read it. The ally colarion of the difficulty, in my opinion, is the construct a weir screece the Damada, but I would not recommend it to beconstructed at Jocjooty, but somewhere higher up near Baniganj and to make a cat nearly 50 miles in length to cenest it with the present canal, as the present wair at Jocjooty will intensity the evil of the rapid silting any of the entrones channel at Jocjooty which is ahaat helf a mile long. At present the silt clearance is done hy manual labour, but the cost is gradually inaccasing owing to the increasing head and lift. If a dredger could be employed through the whole length of the channel, the matter centil he simplified, hat this cannot he done in the present state of the entrones channel at Jocjooty.

  41. Q. Why nat?—Becasse it is only 50 feet wide at the main catrance and that the drager will not cator; and, secondly, it is 600 feet long; 600 feet from the cloice. I think it would be much cheaper to baild a weir at Raniganj, and there is every probability of the canal water being wanted for irrigation in the traot between Baulganj and Burdwan which is more liable to famine and is drior than the cocantry lower down.
- 42. Q. Between Raniganj and Bardwanf—Yes. I um not in favour of widening the existing sand and regalators, or the coastraction of Pulashy distributaries, but the canalization of some of the old streams, each as Khorey, Banka, Kenthi etc. in desirable. Konski, etc., ie desirable.
- 43. Q. Do you think, if these works were carried oat, the thing would pay?—It is very difficult to say. Of cearse I can say it will pay comething, but I do not know how it will stand in the long run.
- will stand in the long run.

  44. Q. The Government may perhaps be willing to make it if it does pay, ur if it would amount proctically to protection from famine and loss of life, but in a place where famine and loss of life, but in a place where famine and less of life does not cour, I think the Government would say that the people who are going to braself the earnal should pay and not the whole centry?—There ere some leading ramindars who are willing to contributs to the cest, as during my own investigations I came to know. There is one mun, Bamo Cherau Bhor, of Haripal, whe is anxious to pay Ho. 15,000 for the restoration of the Koasiki. Baha Amrito Lell Seal, of Satgachin, in willing to contributa Rs. 20,000 for a weir acrose the Danke; Bahu Bepin Bihary Ray of Daghara io willing to spead Rs. 10,000 for a regulator in the Kana Nadi.
- 45. Q. Do you think the people would take water every year ?-Xos.
- 46. Q. Do people is the canal area take takavi udvances to help their works and improve things ?—No. I am nat nware af any one doing so.
- 47. Q. Do they never take it?-No, at least so far as I
- 48. Q. Is there any well irrigation in that country?-
- 49. Q. In most years there is enough of water, leaving out the last few years?—Of course there are records. I was there for five years; there was recreity during those years; there is wont in every ten years.

end the 51. Q. · 53. Q. Y 53. Q ' istrai er 6 f 35. Fat 2 R Q. T 57. Q. : as Q Larr 12 ilengi Ab 41.6 7.:72 010.E. 恋皇, istri. 15 (c.

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-<u>∆</u>: Inigalian 10 sect. 1444 50. Q. Even in years when there is pleaty of rainfall could the crops improve if there was irrigation?—Yes.

5L Q. Would the people think so themselves? - Yes.

52. Q. Who makes the village channels?—The villagern themselves.

53. Q. There is no expense to eneak of ; it is quite cheap, is it not?—Yes.

54. Q. (Sir Thomas Higham.)—What do you say the area of loog leases is in the Eden Ganal ?—26,000 acres.

55. For how many years?-Seven years.

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56. Q. Then what area do you get short lenses for?—The season leosecare for about 3,000 acres.

57. Q. Kharif or rabi?-Khurif. The rabi is very little; about 400 nones.

5S. Q. Have you done altog-ther 29,000 acres within the last seven years?—Yes, of which 26 are on long leases and three on short.

50. Q. And the people prefer long leases ?- Yeo, because the rate is cheap.

60. Q. Since when have you been receiving long leases?

—For the last 10 years. I cannot supply them water in Outsher; I and the greatest difficulty in keep them eatisfied.

61. Q. Some years ago abent 70,000 coros were worked instead of as at present 29,000 cores ?—Yes.

62. Q. What is that due in f-Of coarse I was not in barge of the cenal of that time.

63. Q. You must hereoften wendered at the drop?—I om denhtful whether fully 70,000 acres were irrigated. Another thing is that at that time this wes a new irrigation introduced and people were very willing to take advantage of the irrigation and they voluntarily executed the lesses without knowing the consequence; that le what

64. Q. Did they get them un long lesses or un short sooson leases f-Oa long lesses. Formorly the long lesses were for five years at a very low rate.

G. Q. If they leased 60,000 acres for five year, next year there would be semething over thet, would there not? but the next year they dropped down in 11,000.—That was the first year. Some of them did not pay.

60. Q. If you could irrigate that quantity, then why cannot you do so now?—I am doubtful whether this area was properly irrigated, because where was the supply to come from?

67. Q. We know bow, 20 years oge, you could irrigate 70,000 acres, whereas now you cannot irrigate 30,000?

That was only ahnormal. Next year it was only 11,000.

68. Q. You said that you cannot give a leasn for more thou 20,000 ?—Yes, and even then not properly.

thou 20,000?—Yes, and oven then not properly.

69. Q. I cannot see how you connot?—There is a special reason for that; formerly from the entraces of the channel water was serviced to the view tanks. From here an anlert hoe been mode and canal has been taken out. New this Banks was formerly very deep and during the reiny ocasen water used to come io. Naw the Banks has eited up, so much so that the water does not enter properly. That was nonereason also. I find in 1800-01 I was shie to supply 200 oubic feet. In 1901-02 this was reduced to 95 cubin feet per second, and this yeer it has gone down to 85 cubic feet per second owing to the doctorization of the Banks.

70. Q. These 10 miles in the outrance of the canal, which has silted up, concetyou clear it up?—Yes, but at mormous cost. To clear the block for I mile the cost will be Rs. 10,000 or Rs. 11,000; for 10 or 11 miles you can imagine what the cost to clear the Banks would be. In that case the canal would not pay at all.

71. Do you think people will take water to the full extent

71. Do you think people will take water in the full extent of the apply?—Yes.

of the anply ?—Yes.

72. Q. How many acres per year?—I think altegether 90,000 acres in October in this district of Burdwan as well as in Hooghly.

73. Q. Yon cold that the Irrigation of 69,000 acres has fallen to 30,000 directly they pay water-rate?—Yes.

74. Q. Then why do you think it will increase to 30,000?—At present they council get water when they want it. Irrigation is not going on satisfactorily, but if we can make it satisfactory by means of a weir or by means of a proper ent, I think they will all take the water.

75. Q. Then you think that the reason why your irriga-

75. Q. Thou you think that the reason why your irriga-tion has fallon off is that you cannot get it oatisfactorily?

—Yes, that is what I think.

76. Q. How many square miles do you commond? Roi Durga —50,000 acres are commanded at present. We have 200 Charan square miles above Burdwan and 200 square miles near Chakraoarti. Kanchangar.

77. Q. How much du you irrigate per square mile? 6 Nov. 02.
-At present I irrigate in 300 equare miles only 26,000

nores.
78. Q. That is 30 acres to the sopare mile?—Yes; something like it. In 800 square miles we irrigate a total of 25,000 acres, so it is about 32 acres to the square mile.

79. Q. That is not n very strong demand for irrigation?

80. Q. If you make this weir, will the caual command more country then it does at present f-Yes, they will take up lend and put in new distributaries.

up lend and put in new distributaties.

Si. Q. Why do you say that legislation is required to hind the individual cultivator to pay water-rate? Do not they pay water-rate when they take lesses?—At present the system to this t the lesseholders oro bound to pay water-rate and the outlivator is not. Whenever the lesseholders go to the Givil Court to recover the cultivator's share of the rotes from them, the lesseholders do not get decree, because they have not taken any hinding agreement from the cultivators. The Munsil's generally give their decisions sgainst the lesseholders.

82. Q. Cancot they provent cultivators from taking tha water?—They cannot prevent them, become one outlet applies the water to all the villagers. One cultivator's land may be just in front of the channel, and the others who are willing to pay may have their lands just on the other side.

83. Q. You have no difficulty in recovering from the camindar?—None.

84. Q. Is it very difficult to recover from the cultivator? 84. Q. 10 it very difficult to recover from the cultivator?

— Yes. Those men do not pay regularly and we are obliged to have recourse to the certificate procedure. Lease-bolders here an means of putting pressure on the people; the have we any means of putting pressure on the people; the last resource is the Public Demonde Recovery Act.

Sb. Q. Cannot they increase the zent of the cultivators?
No, because the landlerd himself has done nothing.

86. Q Has the district ever enflored from famine?-No, but from information I have collected I know in 1874 tbero was n famine.

87. Q. Did they have any relief works ?-Yes, they had some relief works in 1896-97.

88 Q. Where were you then !-I was in the Bohar mino. I was on the Sone Canal. In 1896-97 I was in Mnzaffarpur.

80 Q. Do you think it would be better to bring the canel from Rangenj than from a lower place?—Yes.

canol from tangany tana from a lower place f—X cs.

30. Q. Why?—Becams if we make a weir just at
Jesoty, the present head of the mein suirance of the
channel will he silted up and dredging arrangements much
he made. At present a dredger cannot be worked. Another
reason le that the country or trast of country hetween
Raniganj end Burdwan is more lieble to famine.

Raniganj and Burdwan is more liable to famine.

91. Q. The cost of the anal from Raniganj is estimated at from 70 to 40 lakhs; whereas wou in this other place will only out ton lakhs, so that the proposel you ndvocate will be spight times less costly?—My idea is quits different from the one Mr. Misconoly has recommended. My idea is simply to make an anient at Raniganj and to make a chemnel from Raniganj to join with the Eden Canal. That would reduce the cost. According to my estimate it would cost about 8 lakhs of rupees for the weir, and this 50 miles of canal at Rs. 20,000 per mile, which would be about Rs. 10,00,000 renghly, altogether shout Rs. 18 lakhs.

lakhs.

22. Q. You are not at all in favour of having navigation?

—No, hecanse it will not pay. Where there is railway competition I don't think it will work estisfactorily. There is very little water in the Domeda and you cannot got more than 1,200 onhie feet in October and November, and with this supply newigation and irrigation will not work properly, 93. Q. One thunsand and two handred cubic feet will be enough?—Yes; at present the Eden Cannot cannot carry more then 800 cubic feet.

23. Q. You propose in ordered the kriestics of the

94. Q. Yen propose in extend the trigation of the Eden canal?—Yes; at present, if I can get 800 enhic feet, it can be properly worked, but there is no water and I cannot supply. This is the reason why I am niwaye in

95. Q. (Mr. Mair-Mackenzie.)—Mr. Horn gives it as is upinion, that in the Burdwan and Hooghly Districts

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Rai Durga the rice cups are never known to fail. Is that the cass?

Charon —In the high lands it fells sometimes.

Chakravarti. 96. Q. In lands where approaches are likely to be

Charon —In the high lands it fells sometimes.

Chakravarti. 96. Q. In lands where approaches are likely to be dammed, has it ever been known to fail P. Not very much.

Of course a certain pertion sometimes fails.

97. Q. (Mr. Rojoratna Muddler,)—You said leassholders find difficulty in recovering water-rates P.—These ore representative cultivoters. There are no zamindars in many cases.

- 98. Q. They are headmen ?-Yes, they are head setnally, but some of them boye no interest in the land.
- 99. Q. Then why don't you deal directly with the cultivators—It would be a very ombersome process. As far as my experience goes, every individual enlitivator's land will severally bove to be measured, and every individual and unlinear enter will have to be collected from them, and in case they do not pay we would have to issue cortificates against each individual cultivator. So this wenld be n very combersome process.
- rery onmberseme process.

  100. Q. Your revenue establishment coste Rs. to collect Rs. 25,000; that is, about 45 per cont. P—But that does not include only the men sumployed in collection. It slee includes these compleyed in the distribution in water as well as engineering works. Our callection and ongineering and distribution in the E-len Canul are ell in the hands of one stoff. In other canuls they have a separate staff for revenue collection and engineering.
- revone consection and engineering.

  101. Q. Woll, your average area is less than 30,000 acres; don't you think your present staff would be able to measure, assens and callest also ?—Yes, with a little addition. If we have to deal with the individual cultivator, we shall require na additional establishment.
- 102. Q. What advantage de these landlords derive !-121 per cent. commission.
- 103. Q. That does not appear in your revenue necessaris?

  Yes. The system is when we take the mater-rate we take the net amount assessed in the account.
- 104. Q. If that amount is spent on increased establishment, will it not be sufficient?—There must be the headmen te lead these rayats us in other places. There must be ene man te give assistance.
- 105. Q Counct yen adopt the block system ?—Yes, I am trying to introduce it.
- 106. Q. That will ge a leng way to reduce expenditure?

  —The block cyctem does not reduce expenditure; it prevents unautherised irrigation.
- 107. Q. Individual fields in the block can be surveyed once for nil?—You must make a man responsible for that. One cultivotor must be responsible for the water-rate. That man's name must be taken dewn, his residence, hie father's
- 108. Q. Supposing there is a bleek of 50 acres, and these 50 ocres are held by 5 er 6 men, each man's ores will be known, and the holders lu the block will apply for leng leases f-Individual helders will not de ee.

109. Q. Why dan't you take lesses from them individually P—We have from 300 to 400 men in such village; how many lesses will there be f—It will be n most enmbersome process.

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gad rate 11. Q.

- 110. Q. All the men in the block will apply in one lack ?—Yes, and there must be n headman.
- III. Q. Why is it necessary?—So that he will be able to identify them.
- identify thom.

  112. Q. Once you carry out the system, no further inspection will be necessory. The londlord will be beand to pay whether he takes the water or not?—When a man's deld fails, will he not come in with a complaint that woter has not been supplied; then who will make an investigation. So overy case will have to he deelt with.
- 113. Q. Is the difficulty insoperable ?—Then in every particular field guards must be introduced; we will have to have a record of each particular field; otherwise in cases where there will be investigations there will be no record to show that a particular plet of land was not supplied with
- 114. Q. Wen't your canal officers find tims to do this ?-
- 115. Q. What is your present staff ?—At present my atesf consists of two zilladars and one sub-overseer.
- 116. Q. Have you upper subordinotes ? No; there are also certoin special officers.
- 117. Q. Are there no upper embordinates P.—No; in the canal staff there are special officers and temporary zilladars.

  118. Q. What addition would you require to year staff P.—If we are to deal with individual oultivators, I think we will require considerable addition to our staff.
- think we will require considerable addition to our citif.

  110. Q. Would the cost he probibitive?—No, but these things dayend upon the anpply. Unless you increase the supply you cennet do mything. I think emply ebould be increased, because at precent every year the amply is getting reduced, and it because very difficultie keep up the irrigation. Then each zillodar will have to be emplied with two more mohnring, and then I shell be oble to manage with individual cultivators, so that to this commission at the rate of Rs. 122 per cent, which comes to mbout Rs. 3,800, will have to be added, say, Rs. 2,000 a year, 120. Q. That will be a little more than 101 per cent.
- 120. Q. That will be n little more than 123 per cent, ?— I wish to redoes it to 3 er 5 per cent as they allow on the Sone Canal.
- 121. Q. Are you in fevenr of extending the term of the lease?—To more than coven years, ao, because even with the seven years we have difficulty. Leasebelders may die; cultivation may change bande. I would not recommend the extension of the lease to mere than seven years.
- 122. Q. Have the oultivators net occupancy rights?—They sell their rights or become poor, order some reason er auother their lands obange hands.
- 123. Q. Such cases may be treated specially and previded for ?—Yes.

WITNESS No. 61.-Ms. B. FOLEY, C.S., Collecter of Burdwan.

Mr.B Foley 1. Q. (The President.)—Have Enrownn?—Since May 1899. -Have you been leng of

- Birdwinf.—Sinco May 1899.

  2. Q. Yon say in reply to question No. 5 that there was famine in Birdwan in 1874 and severe distress not amounting to famine in 1874; or you happen to know what did happen in Burdwin in 1874; were there deeths frem famine?—As far as I know there was a great deel ef distrese in Ranigonj; n great many peeple came in from Bonkom; there were a let of relief works in Raniganj.

  3. Q. Yon don't know hew many men there were on finding relief in 1897?—I cannot say definitely, as it was before I went to the district. A few kitobens were opened and there was come relief given by the Burdwan Raj in Burdwan and in several other centres. Of conrest here was a strong feeling that in 1874 it was comewhot overdene; I mean that it was not se serioue as it appeared.

  4. O. Generally openking of the district, wentd yon say
- 4. Q. Generally openhing of the district, wenld you say that it is within the famine area of Bengal P—No. I abould say it is practicelly impossible to have famine in Burdwan except under very exceptional elecumstances.
- 5. Q. Such as practically do not exist at present?—I should say so. Except in some small local areae, where the land is poer, famine is impossible.

- 6. Q. Yon say at the beginning of your answers that there are Government irrigation works. Is that the Eden Canal ?—Yes.
- Q. Questions concerning that canal come before you?

  -Yes, occasionally complaints of want of water required.
- S. Q. le it popular? De peeple set etore npon it?— Yes, people accasionally apply to me and say they cannot get water. Thie is principally in the month of October.
- 9. Q. Is it your impression that the irrigation is really popular? Is it in thing that the people are glad to have?—Yes; it is popular.
- 10. Q. I suppose it is practically all rice?-Yes, rice
- 11. Q. What is the population of the district?-
- 12. Q. Hes there ever heen any proposition for irrigating in Bardwan except from the Damada river?—No, I don't think so.
- don't think so.

  13. Q. From whot yen know of the district, do you enprose people would take irrigation and he willing to pay for it every year?—They would pay o certain amount undonbtedly every year for irrigation, but whether they

would pay enough to make the scheme for icoreasing the water in the canal is doubtful.

14. Q. Is there may well irrigation ?—I have never seen any, bot have learnt from the District Engineer that there is a little from smell kachcha wells near the Damoda in oen

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- 15. Q. Now, with regard to shellow reservoirs and tanks, mo there many of both?—Yes, o good meny.
- 16. Q. We found out at Gyo and clearwher it was very cammon thing in those parts where is n slight slope to throw bunds errors the country and confine the water?—
  This is not done in Burdwan, so the country, except in Ranigaoj, does not lend itself to thie.
- 17. Q. (Mr. Allen.)—Your tonks are dug tanks?—Yes nearly everywhere. The other system is in some places osed in the Raniganj District.
- 13. Q. T suppose you have no demand for loans for land improroment?—Yes, there are demands; I have been attement showing the figures for the past ten years.
- 19. Q. Do you know what they do with these leans-they employ the money ?—For making tanks mostly.
- 20. Q. Tanke with the view of irrigation or for drinking purposes?—Irrigation mostly.
- 21. Q. and these tanks are dug tanks from which water liss to be lifted by merhonical means?—Yes.
- 22. Q. De they irrigate rice from these tanks ?—Yea, mostly from them.
  23. Q. Tont is an a very small scale?—Yes.
- 54. Q. (Mr. Muir-Mackenzie.)—A great deal of lifting goes on from these tanks?—Yes,
- 25. Q. (The President.)—You say in reply to question No. 9 "extensive Irrigation . . . . . . . . . . . . . . . . . water may be distributed." Then you say they are necessary; do you mean they are netunlly necessary to protect the district from scarcity?—No, I should have said the works would be advantageous ar expedient; they are not absolutely necessary.
- 28 Q. (Mr. Muir-Muckensie.) I anderstand from you that there are a great many tanks all over the country from while they, fift water. When is this done? In Other to maiure rice; sumetimes also for transulanting by 1-1.
- 27. Q. Never for sowing ?—I have not noticed it being done for sowing, but it may be done eccasionally for seeding but. It is done for tronsplanting and also in Octaber.
- 28. Q. Do yan think as many of these tonks are dug as ore required?—I believe that a number of the tunks that were dug for this purpose have silted up.
- 29. Q. There are no bunds octors the country?-No.
- 20 Q. Do you think people will be able to clear out their old tanks or to dig new tanks If advances were given freely?—Yes, to no creain extent. In the present year I have Re 3,000 to spend in advances. I have received applications that will cover more than that
- 31. Q. You think you will be oble to dispose of Re. 8,000 ? Yos, easily.
- 32. Q. Did you ask for more than Rs 8,000 9-Ro, it was addited.
- 33. Q. Wers you coosulted before the ulletimest was undo !- As far as I remember, no.
- 34. Q. tlew much do you think you can got tid of in on ordinary your f-Iu nu ordinary your wilb o good rain-fell nothing is wanted.
- 35. Q. In the present year and last year how much could you have get sid of if you had carle blanche?—About doolle the ann-ant, I believe, in the present year. Making a gursa, porthaps the semo unuount could have been disposed of last year.
- 36. Q. About Rs. 1C,000 !- Yes.
- 37 . Q. You could not get rid of half a lakh ?- No.
- 38. Q. (The President.)—In a year of exceptional rought?—I don't think so.
- 39. Q. Yoo could not dig a tank in that time to atilise it. By the time thatank was dog it would be over?—Yes.

  40. Q. (Mr. Muir-Mackensic.)—I was just coming to that; could not they be induced to make tanks ready in good years to protect thamsireed a bad years?—Yes.
- 41. Q. Would not an energetic officer advise them to do so !- Yee.
- 42. Q. You are canfident that it would be of mea to them in a bad year?—Yes.

- 43. Q. How many times would a had year be likely to come from of That is very difficult to say. The Burdwan District seems to be getting dry.

  44. Q. You are coming through adry cycle perhaps f—Yes, perhaps the improvement in health and everything class shown that the district is direct than it used to be.
- 45. Q. Are yee quite satisfied as to the persons to whom the advances are given?—There has been no trouble in recavering the sums that here been advanced.
- 46. Q. Have people any trouble in getting them ?- Not on good security.
- 47. Q. It does not take a long time ?-It lakes time to make the necessary encurries.
- 4. 4. It uses not take a long time?—It lakes time to make the necessary enquiries.

  48. Q. (Alfr. Rejaratea Mudaliar.)—The Commissioner of the Surdwan District says in account to question No 5 that tenants, as a role, have not got good enough scourity for Covernment; do you agree with that view?—Yes, I think I would on the whole.
- 49. Q. Are they not occopately tenants in the Burdwan Dietriot P-Yes.
- Distribut 1cs.

  60. Q. It they are occupancy lenants, what is the difficulty about security P-I do not know what the Commissioner's reasons were. Perhaps be meant the character of the people; you most absolutely he sure of your security, otherwise thry will take advantage of you.
- 51. Q. You ran sell him up under the Looms Act?— For advances, yes. As regards the advances, I here per-sonally seen there has been no difficulty to collecting, but I have always taken good security.
- 62. Q. What security do you take? Personal security?— The value of the land. The lond is pledged as security.
- 63. Q. If this is not considered sufficient, you can insist open the applicant for the loan producing other sureties?

  —You
- 64 Q. So there is no difficulty as regords scentity?-Not if the tenent is a substantial man.
- 55. Q. During the post ten years Rs. 37,415 have been advanced as learns for the construction of 110 tanks. This is given in the statement received from the Bengal Government. Do you hoppen to know ie what condition these tanks over Y-No, I cannot say. The loan is advanced and the man makes his tank.
- 56. Q. How do you find out that the man does make the tank, and does not misappropriate the money?—If he misappropriates the money, there is a certain peculty—a summary procedure provided
- 67. Q. Do you reelies my revenae under these tanks ? No. I don't think eo.
- 68. Q. Do'yon know if any odditional aree has been brought under irrigation in tals was?—Sense additional area would came ouder every new taok, I should any.
- 59. Q. Io one of your answers you gave 6,913 ortes as being irrigated?—Yes.
- oring impareur—res.

  60. Q. In the statement received from the Beogal
  Government 18,872 serva are chawn as irrigated from canal
  works; can you explain the difference?—No. I cannot
  explain; the figures I gove were amplied as by the Distiet Romal.
- 01. Q. The figures 18,872 are possibly the ten years average?—Possibly.
- 62. Q. Yon said the grass ennual erop was 527,000 and odd; the statement given by the Gavernoont of Bengal gires 128,000 and odd?—I cannot explain the figures.
- 63. Q. The Bridwan District appearently requires fload enthankments; can you say why the bund which existed so the couth hank of the Damoda was removed?—I understand it was removed because it was found that the rirer was sitting up. It was therefore decided to remove this embarkment and let the water govern a crivin area to the sooth. This was the lesser of two evils.
- 64. Q. (Mr. Nwir-Mackensie).—Can you give me ony lides of the number of these small tanks; are there two or three, or set there are two or three or set there are two or three or three or three.
- 65. Q. Would not wells be the cheaper way of irrigation?—No. I do not think the people care for wells except at Raniganj.
- 66. Q. Hew for below the surface of the ground in the water ? How high have they to lift the water ?—Three or four feet.

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- 67. Q. How hig is the tank generally? Does it cover two nr tured acres?—It is difficult to say; the size of a tank varies very much; generally they are one end a half to twa
- 68. Q. Have they lifto an all eides of a tank?-Gonerally one ar two.

60. Q. What sort of lifts do they gonerally nso?-A-cat-shaped dug-out instrument known as a donga.

To. Q. (Mr. Allen).—Woold you say that those tanks are primarily for drinking parposes or for irrigation?—Most of them have been dug for irrigation. One is sometimes dug operally for drinking water. A zamindar ar patnider makes and necessionally for the heacht of the people.

#### WITNESS NO. 62.—RAJA BUN BEHARI KAPUN, Bordwan.

Raja Bun Behari

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1. Q. (The President.)-You are the manager of the Burdwan Raj P-Yes.

Kapur.

- Kapur. 2. Q. I suppose you knew the whole district very familiarly?—I cannot say I knew the whole district very familiarly, but I knew it partially.
  - 3. Q. You say in reply to question No. 6a that there was a partial famine in 1865; famine in 1874, scarcity in some parts of the district in 1885, and severe searcity not amounting to famine in 1807-98. Do you think it was really a famine F—In 1865 I had nothing to do with the famine myself, but I found out afterwards that the Maharaja of Burdwan open large sums of money to relieve the distress of the people and that there were famine and ecately.
  - at the people and that there were famine and ecarcity.

    4. Q. Do you know how murb was spent.—Rs. 60,000, and there was no Govornment aid opened as far as I am nware. In 1874 the Maharaja opened relief works and I had obarge of these relief centres myself. I know that there was famine as well as ecarcity and accessed lives were lost. We ondeavonred to eave them as much as possible, but it was impossible to save every life.
  - 5. Q. How much did you spend in 1874 P—In 1874 we spent money in two ways, and certain sams were speat as subscriptions and certain sams in his own charitable centre. The sum given as abbscription was a subscription to tres. The sum g
  - the Government.

    G. Q Was it n very large snm P—No, probably about Ra. 25,000 or Rs. 30,000 During the searcity of 1885 we also opened some relief works and doled out rice, sait, oil and also supplied come facil for cooking parpeas. We also had some kitshens opened in certain pisces where they were wouted. Similarly in 1897 we had relief centres in two pieces. In one of them there nero some deaths, but it so happened that these were among the people who came from other districts. We had a centre upon the Grand Trunk Rord which is used by persons travelling from all districts, as there was accordity.
  - 7. Q In reply to question No. 9 as in what general measures should be adopted, ynn say that there is already a canal in existence in the Burdwan District called Eden Canal, which serves portion af Burdwan and Hooghly Districts P—This should be Improved and the excavation and re-exravation should be amounted. tion should be ene onraged.
  - 8. Q. You advocate mreting the deficiency by making a weir. Are you extlasted that the people will take water every year?—They take water every year, but the quantity
  - 9. Q Are they prepared to pay for it every year?—They barn entered into long leaves, and they will have to pay whether they take the water or not.
  - 10. O. Of course a weir aver the Damada would be 10. C. Or course a weir aver the Immana would be very expensive. It is estimated in east aver 8 lake of rapees If that was carried out, do you think there would be very large increase every year?—The capacity af the Eden Uand will not allow at a very large increase. I don't particularly advocate a woir; whot I say is that some means son be devised to acopyly more water.
  - eon bo devised to supply more water, are you satisfied it will be all taken np?—I have stated that in my answer. At precent they have entered into long leaves, but they do not get the water. It you are to supply water, you want anfiliests water in the canal. At prevent people enter into long leases with the sole object and idea of depending solely upon the Irrigation Department, and they hope they will get the water as they require it. Bot the Irrigation Department have heen unable to supply water, breake facilities don't exist to allow sufficient water to go into the canal. There are many comploints, and probably soom of these days three people will be launching suite ogniest the Government for dayses.
  - 12. Q. In the meantime will they give up these leases?
    —I don't think ao. Men live in the hepes that if they don't get the water in ane year, they may get it in the next foar years. I don't think they will give ap the leases.

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- 13. Q You don't think in ordinary years there is onough rain water to get on without irrigation?—If there was sofficient rainfall we could, but we do not get it in the proper time. We do not get rain in the months that we require it and we get more than we want at ather time. Moreover, the people like to start their oultivation as early as they can if they can only get the water for irrigation; evan to grow their seeds they are willing to take it. (Reads from paper).
- 14. Q. I don't quite sea what the read cess bee got to do with it. Of course they don't wish to pay any more if they cannot get any benefit, but if they are going to derive any benefit, they will pay whether rayat or zamindar i—If they get heacht.
- 16. Q. One spends money with the abject of gotting advantage ?—Yrs, but the zamindar also considers whether the rayst will give him any increment as the reat to make him was him pay
- 16. Q. Will the zomindar himself not go to the appense to ensure irrigation ?—Generally they are not in a better condition. Unless they combine they wou't do it.
- 17 Q. Is there n great deal of irrigation effected by
- tanks i—Yes.

  18. Q. And in the dry years I suppose these tanks run dry?—They all dry up. I don't mean there is not conficient water for them to wash their hands and feet; what I mean there is not enough to irrigate in the years of cevero drought. These tanks shoold be divided ion three alasses—the larger tanks, medium tanks and small tanks. There are neveral tanks which are used for dricking purposes, ond there are tanks which are stuated in the centre or larder of the field which are used for irrigation parposes. Them there is a third class of tank which is generally called "Dobss" or "Khirkeopukar" which croatfached to almost every bone in Bengri and are used by notive ladies for washing their pots and paos in and washing porposes generally.
- 19. Q. How much irrigation do you get from ony nuo tonk f-That depends upon many things—the size of the tank, the depth of the tank, etc. I am not take to give ony opinion, but I know this that each tank can irrigate a large
- 20. Q. About a bundred bighos ?-More than that,
- 21. Q. The woler is all lifted f-Yes; they either lift it or they ent on embankment in allow the water to run ant.
- 23. Q. Then these tanks are not altogether under-ground?—They cot ombankments only where tanks are situated on a slope, or na higher ground. They also oso the balling system.
- 23. Q. The people don't use wells ?- In this part uf the country they do not, but in the Bankura District they du.
- 21 Q. The Raja has got property in the Bankura District t—Yes, the Raja has got property in 10 districts, but the corpus of the estale lies in these five districts— Bandwan, Bankura, Birbhum, Hooghly and Howrah.
- Bardwan, Bankura, Birbhum, Hoeghly and Howrah.

  25. Q. In reply to question Nos. 9 and 10 you say, with regard to the obstacles to irrigation works, that the imporerished condition of the country interferes with their extension, but if concessions af the kind granted in 1874, numely, a remission of one-third of the one advanced, are allowed every year, zeminders and tenants, both alike, might be induced to excavate and re-excavate irrigation tanks and wells; you can hardly appear the Government to do that?—Yes, I do, and for this reason that when there is a famine the Government do not healtale to spend huge sums of money. Then why not opend moosy and take this precaution of provention. A few recommendations which have strack me I have put together. In my note some amount af ninney should be allotted every year and some saw tanks should be excavated for the purpose of staring water.

28. Q. Do ir his i-I the State times then Hinda Ly-nunerous at the own a and iri-2. Q i inches ( in an log the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the stat heade at F2 35.2 23, C. E 

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26. Q. Do you think that the district funds should pey for this?—I stated in my paper that it should come out of the State, Imperial or Provincial Funds. In former times there were Baselani tonks during the period of the Hindu Rajas and Mahamedan dynasties when there were numerous tacks all over the country prisoipally occavated at the cost of the State for the scopply of water for drinking and irrigation purposes.

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27. Q. (Sir Thomas Higham.)—People take long leasen in order that when critical times come they will get water, but at such times they do not get water?—Yea.

but ni such times they so not get which reless.

28. Q. Why do they go on taking long leases ?—Because they are hoping to get water. If one one takes a long lesse, the pays five among per bigha or one rupeo per area. If he takes a someon lease, be will bere to pay more. Peopla like to be sure that they will get water for five years at a cheap rate, because of present the rainfall is becoming acuatier year by year.

29. Q. Bet they do not have to pay for a year in which there is plenty?—They will save on that year, it is true; but when he is in need of water he might not get it, and to avoid the disappointment he wants to be assured of his getting it. That is the reason he wants long lenses, but he takes a lease for five years and ensures getting the water for that period.

30. Q. When the water-apply fails, as It has this year, is there may ramission of the water-rate?—No, not that I know of.

31 Q. Should it he given ?—My own opinion is they should got nomission. They got sufficient water, whose lands are close. These have the advantage of getting it first. Those further off get it last, so that the tenants fight at the time as to who will get the water first. The men would poy oven 8 annas per bigha, or Ro. 1-8 per acro if they were sure of getting the water in time.

32. Q. Have you ocen the opinion sent in hy Raja Peary Mohun Mukerji. He does not hold the same view as you do?—Opinions differ. His opinion is not mine.

33. Q. But these people regard it as of great hardship that they have to pay an annual charge for water?—I think the Irrigation Department will be able to satisfy you that be himself wants water for irrigation.

that do ministr water water for integration.

34. Q. They want it in seasons of drought !—Of course there is always a blank oud a bright side in everything. If we take u long lease la good years, we do not want the weter, but we must pay for it. I have seen Raja Perry Mobon Mukerji's vlow, but I do not agree with it oltogether.

35. Q. With regard to the difficulty that owners are said to here in recovering water-rates from their tonants. Whon owners take long leoses do they find any difficulty in recovering water-rates from their tenants P—Yea, there are some difficulties. I have token a loase for five of my Khas Mahals and I paid the money first, but my difficulty is to realiso from my tenants.

36. Q. Why do not the tennals ray?—Tenonis will gladly ray if they are sure of gettleg woter.

37. Q. When they get good crops will they pay?—Yes; lost year they have suffered and this year they are going to suffer ognin.

sulfor ognin.

38. Q. If the supply is good and there is a good crop, there is no difficulty between landlord and tonant ?—But please remember the landlord bos difficulties in realising either rent or water-rate. He has not your cheap means af realising. His difficulties remain the same whether it is a good year or u bad yeer. Some teaents will not keep back a farthing, but the majority will not follow that rule.

39. Q. If they get a good crop, they do not make n fines?

The chances are that they will pay. We cannot eject a troublesome tenant and cannot remove his nome from the lease, and will have to suffer for the full five years.

40. Q. Arc acason leases applied for by the zamindars or the tenants ?—In some cases by zamindars and chiefly by a combination of tenants. No leases nro granted to individual persons unless they are men of substance. Gonerally 5, 10 or 13 tenants have to join together to get

41. Q. What is the size of a block?-It differs very

42. Q. I think it is in the hands of the Sob-divisional Officer P-Chiefly.

43. Q. Do you think a great deal can be done by keeping tanks in order ?--Yes, I think so. I hove udvocated that.

44. Q. How long does it take for a tank to ailt up P-I all depends. If properly dug, it may not silt up for 25 or 80 years, and it does not require any numeric cost of upkeep.

45. Q. When a tank is silted up what is the best thing to do; clean it out ognin, or build a new one?—It is obenper, much chenger, to clean it put.

much cheaper, to clean it out.

48 Q. When the tank is filled up the bed is very good for antitvation?—That is quite passible; some old tonk hede are so used; but people generally re-excavate old tank in preference to meking new ones. Moreover, most of these old tanks, which were made negs ogo, are on the best sites which command the fields and are very suitable for conding down the woter for irrigation purposes.

47. Q. When people clear out tanks du they use the silt for their fields?—Yes, in small quantities. It benefits very much if any one undertaken the cest, but very fow people care to do so.

people care to do so.

43. Q. When you clear n tank will the people come and remove the silt for the purpose of improving their fields?—

Yes, sometimes, but you have to pay for the labor and this is a deterrent: no n general rule, when we dig tacks, we take up the silt and put it on the embankment, and this being very good soil, we grow plantoine and pumpklus in these places.

40. Q. I suppose the tanks want clearing out once in every faur ar five years ?—No, once in 20 or 25 years; they are never excavated before 20 or 25 years.

50. Q. It takes 20 or 25 years to silt right up; you could clear it out when it has got anly a foot of silt?—Wo do not do that; it is very expansivo. Wo naually wait until it has lost the capacity of holding fresh water for irrigation; that is our criterion.

Salon; that is our criterion.

51. Q. Docait not often happen that there are men who wish to make a tank, but connot make it hecause they cannot get the land for it?—In same villages that may be the case; sometimes it happens that o man has get money, hat has not get the land. Some here land and have not money,

52. Q. A man has to get the permission of the landlord to dig a tank ?-Yos.

53. Q. But is not the landlord olways very willing to give permission?—That depends upon who the landlord is, Samelianes a landlord will be very glad to give up land for a tank, and sometimes he will not. It oll depends open the purtlemlar person.

the purticular person.

55. Q. Can nothing he done to incilitate the acquisition of land for private owners P—Private owners cannot acquire the land. It is only Government who can acquire I don't think Government on acquire for private owners.

55. Q. Do you think it would be advantageous for Gov-ornment to acquire it?—Yes; if anyone wonts to make a tank and does not get the lend, it would be much better for Government to acquire the land and moke it over.

56, Q. Of course that would require on unendment of the present Lond Acquisition Act?—Probably it would; but I am not sure whether the present Act would not cover

57. Q. Do you think it would be a good thing for Government to do that !- Yes.

58. Q. If n man applied to the Collector, stating that he wanted lands to make a tank, would be get bim the land for it?—Yes, probably be could.

59. Q. (Mr. Muir-Mackenzie.)—What kind of work did you give relief labourers ?—Chiefly digging out tanks.

50. Q. (Alt., Alunr-alaenemics)— when kind of work did you give relief labourers?—Chiefly diging out tanks.

60. Q. If tanks are so useful for irrigation, wby did not you employ them for irrigation?—We are very peculiarly situated; we have leased our land in perpetuity; we have no direct management, and unless we have direct management we do not spend money on irrigation.

61. Q. (Alt., Rejaratina Aludaliar.)—Would it not pay to construct irrigation works and get enhanced reut?—Well, there is a system in voguo in the Raj called the putni system. The Government has actifed the land in perpetuity moder the "Permanent Sattlement Act," and the zamindor in his turn has leased out the property under a lease called putni, and we there are astiled in perpetuity, we cannot raise the rent by a single pice.

62. Q. Saraly ym can by providing irrigation to non-irrigated lands?—We annot do so unless we are asked by putnilar to do so. Glernelly the putnilars da not want us to interfere in any way. We would be only too glad if they came forward and asked us. Within the last 17 years of the Court of Ward's management I do not know of a single instance of putnidar coming forward to make each a request.

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- - 64. Q. Do you offer any encouragement to the tenante to construct tanks?—Yes, if it is on the property under any direct monogement, you must divide between such properties and those on putal lense. As regards not putalize, we don't encourage onything. The putalidar loss number of tenants noder him, and he has power to take an enhoused rest from them. rent from them.
  - 65. Q. Have they power to onhance rent?—Yes, they do hat under the present law how for they have power to enhance I do not know.
  - ontanes I do not know.

    66. Q. Does the Bengal Tenancy Ast npply to your land?

    —Yes. These middle-men know how to go ebent enhancing rent. For instance, n putnidor who may all. 2,000 has an annual profit of Rr 12,000. I nm not enmplalming. I like to see that my tocante are rich, but I only eay this to show that they can enhance rent while we cannot nake a farthing. Under those circumstances you cannot ask nat to spend money on irrigation to benefit them while we get nothing. I think that n remission of one-third of the loan should be given as in 1837 as an encouragement in the people to take land and excavate tanks.
  - 67. Q. Do you think that will be foir to the general tax-payer?—Strietly speeking, I don't think it will be nufair; you have in spend vast arms, then why not spend some money for presentive works? The zamiudar is also n tax-payer, and when you had famino we also outseribed.
  - 68. Q. This is private generosity 9—Then this would be State generosity. The State ought to be more generose then private zamindors.
  - 69. Q. How much money has the Siniospent in this woy during the last ten years !—I can't say exactly.
  - 70. Q. Suppose the State remits the Interest nuly ?— We remit interest on the onm advanced. The State might to do something more.
  - 71. Q. Io it a very large sum?—Hitherto the practice has been to spend only in years of concity. Advances should he made now in ordinary ceasons. Ynn hove just now heard the Collector say that he advanced only Rs. 1,600 ar 2,000 annually, which is a very small sum; we ourselves spend more timn that nunually; this year we have spend Rs. 12,000. I have advocated that advances should be made in each year to safeguord against famine.
  - 72. Q. Do you give the condrainces in tenonts or put nidres?—As I mentioned just now, I don't give a pie to the
    pot nidars. It is only to the tenants of the cetates that ore
    directly under my management. I am not going to pry
    n pice for his benefit unless hoosks. If he spends 12 annus
    and asks me to give him 4 annas, I will be very glad to do
    it.
  - 73. Q. (Mr. Allen.)—Can you tell whot a tank costs to make?—It depends upon the size.
  - mato?—It depends upon the size.

    74. Q. Say one about 3 bighas?—About two theesand rupees, but even here it all depends upon the depth and nature of the soil. It it is hard soil, it will cost more. If you neet with a spring suddenly, the cost of bailing out the water will be great; generally for a tank of about three bighas, Rs. 1,500 to Rs. 2,000 will be quite sufficient.

75. Q. Is the excavation of n silted tank an expansive matter? What will it cost to excavate a fully silted tank of that size?—Say half the amount. There also it will depend upon how most it has silted np, because some tanks have silted up as much that they have been tarred into paddy fields. If it is its alted up, the cost will be in provertion. portion.

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  76. Q. You epoks about the advisability of the Government giving an ard of the tokens loan as a premium against famice. I suppose the femius expenditare in Burdwan since 1892 has been very little?—Very little. Burdwon has been fortunote in that respect; if there is no famine, I don't wont acything.
- 77. Q. What measure do you adopt? Do you toke long leases from your tenants?—I don't take ony leases from them. I simply write the nome of the tonant and wake it over to the gomenta to realise from him. First of all they must send in a patition, then I take cetion.
- 78. Q. Have you been certifying these amountage due?

  Le coch coses where I was forced to I collected by suits.
- 79. Q. Is it the practice in Bordwan to charge a tenent salomi if he makes a tonk ?—It all depends upon the noture and hebit of the loudlord; we never do it; come landlords ne doubt de se.
- 80. Q. Do not some londlords object to tanks being og ?-If it is for irrigation purposes, I don't think be will ojret. object.
- 81. Q. As a matter of foct, rent is not charged for tanks ?—Some ront is charged.
- 82. Q. How would the rent of n tank compare with rice land P-Supposing there is a tank of 4 bighas, we charge only 4 nances simply to have a nominal rent, jost to differentiate between rent-free and rent-paying land.
- 83. Q. Whot would the charge he for the same erec under rice?—It would depend upon the loy of the land. Generally speaking, it would be obout two rupces per bigha.
- 81. Q. You told Sir Thomos Highom that the land should be acquired under the Land Acquisition Act. Under that Act the owner get 15 per cent. arer the market value would not the roynt find that expensive P—Yes, but if he wants the tank, he must pay for it.
- 85. Q. Still he would have to pay 15 per cent. over the market value?—There is no bely for that; if he is desirons of having the tank, he must pay.
- 86. Q. (Mr. Muir-Mackrazie.)—You said you give odrances; what do you give them for ?—I give some for the improvement of their tanks ead chiefly for buying seedlings and sopplying themselves with implements for caltivation.
- 87. Q. Very little for improving tanks ?-Whatever they ask for.
- 83. Q. They don't oak for much !- No.
- 88. Q. They don't set for much! ?—No.

  89. Q. Do you think then that, if there is plenty of muney made available, they would ask ?—I am sare of it, because the taken advances, os I have already said, are generally made in years of searcity. If the people are told that they can have money from the Collector or District Board, as I have added in my note, you will make thom advances, and give up one-thind or whatever proportion may please Government, the chances are that the mojority will come forward and take advances every year.

  90. O. 187c. 181c. —You proke of an agent of 100 bigins.
- 90. Q. (Mr. Allen.)—Xon spoke of an aren of 100 bighus being irrigated by one tonk; what sort of tank?—A tank of one or two acres would irrigate about 300 bighas.

#### WITMESS No. 63 .- BARD HART DAS PAL, District Englness, Burdwan.

Bobn Hari 1. Q. (The President.)—You are District Engineer of Due Pal. Burdwen?—You.

which is the training of the form of the contract of the contr

2. Q. How long hern yon been there?-Nearly 11 years; 6 Nov. 02. since 1892.

- 8. Q. During that time hove you seen many had years?

  —I have seen two years of scarcity; a purtled famine in
  1893 and some scarcity in 1899.
- 4. Q. Do you think there was anything you could really call it a fourine?—No.
- 5. Q. Had you relief works?—Wedid have relief works.
  They were not hage. We opened relief works to excavate tanke, and did some village road-moking to relieve the villagers in these ports.
- 6. Q. In your ofotement which we have only just got this morning and have not had time to see through, you say that the area irrigated by private irrigation works, such as wells and tanks, is about 12,0000 acres P—My idea is that, of the total area, about our per cent. of the lond is commanded by village tanks. In years of drought these tanks ere not full.
- 7. Q. Do they get any benefit still from them P-Yes, n little.
- 8. Q. There must be a greet number of tonks? -Yes, there are a great number in each village in the cultivated
- erea.

  v. Q. Da each of these funks irrigate a larger area than itself?—Yes. Many of these rayats have the right to

of a silved lark as expensive to communicating the dank and the first three danks it will be the first three danks as silved as how home to be the first three beauty and the first three danks and the first three danks and the first three danks and the first three danks and the first three danks and the first three danks and the first three danks and the first three danks and the first three danks and the first three danks and the first three danks and the first three danks and the first three danks and the first three danks and the first three danks and the first three danks and the first three danks and the first three danks and the first three danks and the first three danks and three danks and three danks

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berram his ro the right to irrigate their field from certain tanks, but in years of drought they do not get the foll benefit.

10. Q. Do you think that a took will irrigate five times to men P - I am not quite ours of that.

11. Q. Have you seen anything of the irrigation in the Eden Cacal ?—Yes. I have gone about the district and seen what is being done.

12. Q. Is the cirrigation in the Eden Canal very valu-ble to the district?—Yes, it is very valuable. It is much ued by the rayals.

values ny me rayata.

13. Q. Do you think that it abould be enlarged, and if it was colarged, would more land be irrigated?—If the supply was increased, it would command a larger orea than it does at present.

14. Q. They pay per sere for irrigating?-Yes, most of it is by lease.

15. Q. Thou I suppose they take water whether they want it very much or not, because they have to pay for it?—Yes..

16. Q. Do they make complaints about paying for leases and not get water?—Yes.

17. Q. Are the complaints well-founded?-Yes, in most

18. Q. You say in reply to question No. I (the question being as to what general measures should be adopted) you recommended extensive irrigation works as necessary; are they to be ondertaken by the Government or District Board, or both P.—Undor the Act the District Roard is not ollowed to do my, irrigation work. Until the Act is amounted they cannot undertake each work.

19. Q. Are you e member?-I am net u member. I am

the congineer.

20. Q. Do you think that the Board would like to have
the power and would they use it P—Yes, I think they would
like to hove it, because this is a sort of local work and they
would like to get benefit.

would like to get benefit.

21. Q. They would want more money?—Certeinly. My idea is that there are certain neves that are more liable to famines than others. A list of the tanks in these sreae might be made end o list of tanks silted up. An order might be passed that a register chould be kept of such tanks and the owners might be asked to re-excavate thom out of their own fands; and if they complain of want of fands they may be acked to take complain of want of fands they may be acked to take edvances from the Government under the Agriculturkis Leans Act; and if they decline to do it, such tanks may be acquired by the Government and reevenuted. Then the rayar may be clarged a water-rate. This may be one course of income which may be placed in the lands of the District Boord. I think they would be willing to pay. I think they would poy semething like 8 course 3 highs.

22. Q. (Mr. Muter-Mackenzie)—The man when the limits and the second of the course of t

22. Q. (Mr. Muir-Mackenzie.)—The men who get the ober?—Yos.

23. Q Has suyhody class to pay?-No; it will not be a general rate.

24. Q. Have you only experience of well irrigation P.—I bove seen only some kachcha wells in the district which are used for Irrigating only regetables and pulse.

25. Q. The people prefer tanks P-Yes.

26. Q. For diggieg tanks do they take takavi odvonces ow P-in some cases not much.

now r-11 some cases not muon.

27. Q. Why do they not take them freely?—Probably the system is rather complicated. They have get to apply; then some officer is deputed to sequire whether it is worth giving him the memory, whether the accurity officed is sufficient, etc.

28. Q. Do you think if the system was made easy, they would take advances more freely P—Yes, I think so.

29. Q Do they complain of the rate of interest !-- No. pover heard of such complaint.

80. Q. You say the system is very complicated ? -- It is not easy to get access to the Collector and to get advances under that system.

31. Q. (Sir Thomas Higham.)—Do you think a great deal cen be done by re-executing old village tanks?—Yes.
32. Q. Where is the mency to come from?—From the Proviocial Rusenne.

33. Q. Hove you any idea how much water is required for flooding an acre of land? —Semething like 14,000 cubic feet for a depth of four luches.

34, Q. What will it cost you to remove that 14,000 cubic feat of silt ont P-Rs. 75.

85. Q. Then you must pay Rs. 75 for getting stomge for B thu Har i one occe?—Yes.

26. 9 core? — X cs.

36. Q. How can they shord to pay water-rate and interest on that? Do you mean to say that the people would pay interest on that? What will the interest on Es. 75 come to?

—It will be about Rs. 3 whether they wout the water or

S7. Q. I don't see how they are going to berrow the money and pay interest?—If the villagero agree to pay, of source, they would.

33. Q. They cannot poy Rs. 3 an acre for clearing out the whis?—That is too much. Prebably they would he will-ug to pay 8 annas a bighde or Re. 1-8 an acre, the clauce Re. 1-8 being horne by Government.

39. Q. Then the remainder will have to be paid for from other source—by Government or by somebody else

40. Q. Is there any cleaning out done in the old tanks ?
—Yes, but not mosh. We see now and then one or two tanks cleared up.

41. Q. By the zamindar?-No, not zaminders, the

42. Q. Do they take the silt for manuring purposes ?-Th

43. Q. How far !- They carry by carts to their fields.

44. Q. Do they carry it n milc?-Yes, that they do.

45. Q. 10t they carry it mile?—Les, that they do.
45. Q. (Mr. Muir-Mackenzis.)—How much money do
District Boards spend on these works is years of searcity?
—About two or twelve thousand rappees.
46. Q. If the District Boards bad been spending that
amount of money upon the improvement of tanks, or in
making new tanks, oil this expenditure or a meterial pert
of it is the famine year would have been onved?—It is
again not certain whether o famine would occur is the same
place in case of drought; that is the principal thing.

47. O Wald were fault to search a salest more resident.

47. Q. Would you find it easy to select meny sites for new tanks?—Pleaty of sites. I do not know whether owners would give the lands free of cost, or whother they would have to be ocquired.

48. Q. Most of them ere ecoupied by old tanks !- Not

49. Q. How is the irrigation brought, by lifts ?- Yes, es one to three

50. Q. How bigh is the lift !- Three to four feet.

61. Q. You must here to lift nine or ton fret by succeedive lifts?—Yes.

53. Q. (The President.)-For rice irrigation ?-Yes. 63. Q. (Mr. Mnir-Mackenzie.)—That is not done aroughout the whole occson?—No.

54. Q. Only when the crop is le c criticel cendition?-Yes. 55. Q. Mr. Horn has soid that in this district of Burdwan ries has never been known to fail entirely; is that true?—Of course there are certain years that are weres to some crops. There is no regular failure over the district. There may be a partial failure.

50. Q. What is the lowest oreps you have ever known in the district ?-I think the arounge is 8 causes.

57. Q. (Mr. Rejaratna Mudajiar.)—With regord to existing tanks, collivators pay a rate which luclode a certain charge for water?—I do not know whether they pay ony rote, but they here a right to water from some villege touts.

58. Q. They pay rout which may be precamed to include it?—Yes, these rates have been fixed many years

age.

50. Q. Do you think they can joedly be called upon to pay a higher rate if an old work is restored?—Yes, but I do not know whether they will agree in every case.

60. Q. Would it be fair; they are outified to water end held the land at a certain rent?—Yes.

61. Q. If a tunk was silted up and the owners did not clear it, could the tenants sue the ewners?—I do not know. I have never heard of such sails.

I have never heard of such suits.

62. Q. You said the District Board spends ten or twolve thousand rapes on extring works. They are not for frigation works?—They semetimes use it for irrigation worls?

63. Q. Bot they have no power to spend money on irrigation?—They means it for drinking-water, but the rayests use it for irrigation and the Board cannot prevent it

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